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ANNUAL REPORT

OF THE

MINISTER OF MINES

FOR THE

YEAR ENDING 31st DECEMBER,

1901,

BEING AN ACCOUNT OF

MINING OPERATIONS FOR GOLD, COAL, ETC.,

IN THE

PROVINCE OF BRITISH COLUMBIA.

THE GOVERNMENT OF
THE PROVINCE OF BRITISH COLUMBIA

VICTORIA, B. C.:
Printed by RICHARD WOLFENDEN, Printer to the King's Most Excellent Majesty.
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PRICE FIFTY CENTS.

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REPORT

OF THE

MINISTER OF MINES,

1901.

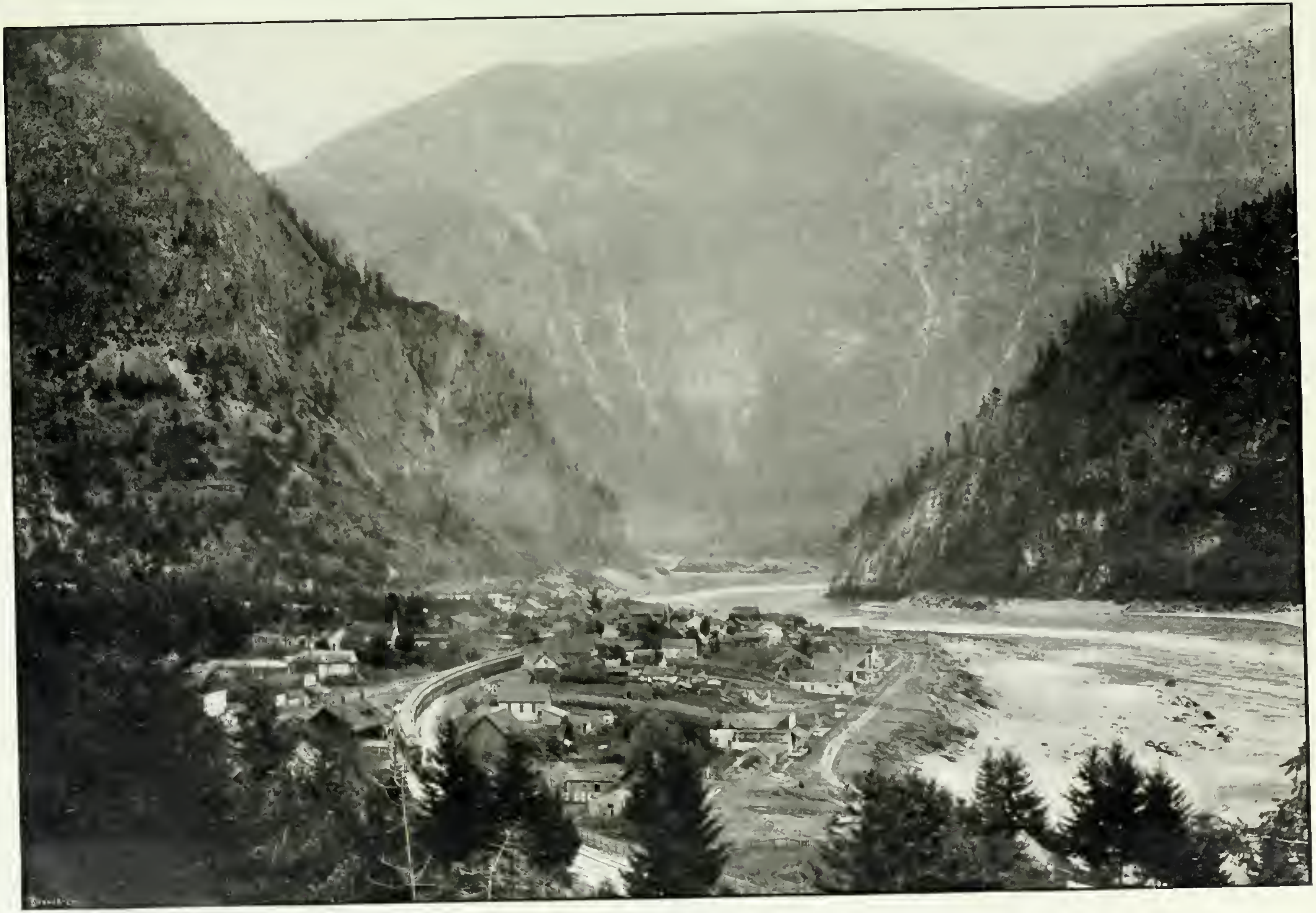
To His Honour The Honourable SIR HENRI GUSTAVE JOLY DE LOTBINIÈRE, K. C. M. G.,
Lieutenant-Governor of the Province of British Columbia :

MAY IT PLEASE YOUR HONOUR:

The Annual Report of the Mining Industries of the Province for the year 1901 is herewith respectfully submitted.

EDWD. GAWLER PRIOR,
Minister of Mines.

Minister of Mines' Office,
March 11th, 1902.



YALE, FRASER RIVER—HEAD OF NAVIGATION.

REPORTS

—BY—

WILLIAM FLEET ROBERTSON, PROVINCIAL MINERALOGIST.

—o—

To the Hon. E. G. Prior,
Minister of Mines.

Sir,—I have the honour to submit herewith my Annual Report on the Mining Industry of the Province for the year ending December 31st, 1901.

The following statistical tables give the total mineral output of the Province to date, and show in considerable detail the actual mineral production of the past year, as based on smelter or mill returns; also a summary of the production of each of the last four years, thus illustrating by comparison the progress made in productive mining during this period.

To facilitate comparison with information previously given, I have retained, as closely as was possible, the general form already established for such tables and for the Report.

I have the honour to be,
Sir,
Your obedient servant,
William Fleet Robertson,
Provincial Mineralogist.

Victoria, B. C., March 11th, 1902.

MINERAL PRODUCTION OF BRITISH COLUMBIA.

METHOD OF COMPUTING PRODUCTION.

In assembling the output of the lode mines in the following tables, the established custom of this Department has been adhered to, viz.: The output of a mine for the year is considered that amount of ore for which the smelter or mill returns have been received during the year. This system does not give the exact output of the mine for the year, but rather the amounts credited to the mine on the company's books during such year.

For ore shipped in December the smelter returns are not likely to be received until February of the new year, or later, and have, consequently, to be carried over to the credit of such new year. This plan, however, will be found very approximate for each year, and ultimately correct, as ore not credited to one year is included in the next.

In the Lode Mines tables, the amount of the shipments has been obtained from certified returns received from the various mines, as provided for in the "Inspection of Metalliferous Mines Act, 1897." In calculating the values of the products, the average price for the year in the New York Metal Market has been used as a basis. For silver 95 per cent., and for lead 90 per cent., of such market price has been taken. Treatment and other charges have not been deducted.

TABLE I.

Total Production for all Years up to and including 1901.

Gold, placer	$ 63,554,543
Gold, lode	17,161,463
Silver	16,534,554
Lead	9,622,689
Copper	8,809,546
Coal and Coke	54,157,315
Building stone, bricks, etc	2,350,000
Other metals	51,878
Total	$172,241,988

TABLE II.

Production for each Year from 1890 to 1901 (inclusive).

1852 to 1889 (inclusive)	$ 71,981,634
1890	2,608,803
1891	3,521,102
1892	2,978,530
1893	3,588,413
1894	4,225,717
1895	5,643,042
1896	7,507,956
1897	10,455,268
1898	10,906,861
1899	12,393,131
1900	16,344,751
1901	20,086,780
Total	$172,241,988

Table III. gives a statement in detail of the amount and value of the different mineral products for the years 1899, 1900 and 1901. As it has been impossible as yet to collect accurate statistics regarding building stone, lime, bricks, tiles, etc., these are estimated.

TABLE III.

AMOUNT AND VALUE OF MINERAL PRODUCTS FOR 1899, 1900 AND 1901.

	Customary Measure.	1899.		1900.		1901.	
		Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Gold, placer......	Ounces.......	67,245	$ 1,344,900	63,936	$ 1,278,724	48,505	$ 970,100
" lode.. ...	"	138,315	2,857,573	167,153	3,453,381	210,384	4,348,603
Silver.............	"	2,939,413	1,663,708	3,958,175	2,309,200	5,151,333	2,884,745
Copper	Pounds	7,722,591	1,351,453	9,997,080	1,615,289	27,603,746	4,446,963
Lead	"	21,862,436	878,870	63,358,621	2,691,887	51,582,906	2,002,733
Coal	Tons, 2,240 lbs	1,306,324	3,918,972	1,439,595	4,318,785	1,460,331	4,380,993
Coke	" "	34,251	171,255	85,149	425,745	127,081	635,405
Other materials...	....	... .	206,400	... .	251,740	....	417,238
			$12,393,131		$16,344,751		$20,086,780

TABLE IV.

PRODUCTION OF MINERAL BY DISTRICTS AND DIVISIONS.

NAME.	DIVISIONS.			DISTRICTS.		
	1899.	1900.	1901.	1899.	1900.	1901.
CARIBOO DISTRICT	....	....	....	$ 381,900	$ 684,527	$ 538,700
Cariboo Mining Division	$ 180,000	$ 162,000	$ 279,600	....	....	....
Quesnel "	193,300	510,000	240,000	....	....	....
Omineca "	8,600	12,527	19,100	....	....	....
CASSIAR DISTRICT	....	....	....	819,380	467,479	322,949
KOOTENAY, EAST, DISTRICT.....	....	....	....	523,666	2,855,851	2,746,839
KOOTENAY, WEST, DISTRICT	....	....	....	6,187,859	6,020,783	8,159,662
Ainsworth Division..	297,930	349,465	331,011	....	....	....
Nelson "	879,185	787,082	1,244,568	....	.. ..	....
Slocan "	1,740,372	2,063,908	1,865,752	....	....	....
Trail Creek "	3,229,086	2,739,300	4,621,299	....	....	... .
Other parts "	41,286	81,028	97,032	....	....	....
LILLOOET DISTRICT............	....	....	....	69,558	88,493	48,383
YALE DISTRICT	.. ..	....	....	315,865	1,422,465	3,317,686
Osoyoos (Grand Forks-Kettle River) Division	234,167	1,358,383	3,250,986	....	....	....
Similkameen Division.........	6,609	4,800	4,680	....	....	....
Yale "	75,089	59,282	62,020	....	....	.. ..
COAST DISTRICTS (Nanaimo, Alberni, W. Coast V. I., Victoria)...	... .	....	....	4,094,903	4,805,153	4,952,561
				$12,393,131	$16,344,751	$20,086,780

PLACER GOLD.

Table V. contains the yearly production of placer gold to date, as determined by the returns, sent in by the banks and express companies, of gold transmitted by them to the mints, and from returns sent in by the Gold Commissioners and Mining Recorders. To these yearly amounts one-third was added up to the year 1878, from then to 1895 and for 1898 and 1899, one-fifth, which proportions are considered to represent, approximately, the amount of gold sold of which there is no record. This placer gold contains from 10 to 25 per cent. silver, but the silver value has not been separated from the totals, as it would be insignificant.

TABLE V.

YIELD OF PLACER GOLD PER YEAR TO DATE.

1858	$ 705,000	1880	$1,013,827
1859	1,615,070	1881	1,046,737
1860	2,228,543	1882	954,085
1861	2,666,118	1883	794,252
1862	2,656,903	1884	736,165
1863	3,913,563	1885	713,738
1864	3,735,850	1886	903,651
1865	3,491,205	1887	693,709
1866	2,662,106	1888	616,731
1867	2,480,868	1889	588,923
1868	3,372,972	1890	490,435
1869	1,774,978	1891	429,811
1870	1,336,956	1892	399,526
1871	1,799,440	1893	356,131
1872	1,610,972	1894	405,516
1873	1,305,749	1895	481,683
1874	1,844,618	1896	544,026
1875	2,474,004	1897	513,520
1876	1,786,648	1898	643,346
1877	1,608,182	1899	1,344,900
1878	1,275,204	1900	1,278,724
1879	1,290,058	1901	970,100
		Total	$63,554,543

TABLE VI.

The information as to production in the earlier years is obtained from the "Mineral Statistics and Mines" for 1896, Geological Survey of Canada.

PRODUCTION OF LODE MINES.

YEAR.	GOLD.		SILVER.		LEAD.		COPPER.		TOTAL VALUES.
	Oz.	Value.	Oz.	Value.	Pounds.	Value.	Pounds.	Value.	
		$		$		$			$
1887	......	....	17,690	17,331	204,800	9,216	....	....	26,547
1888	......	....	79,780	75,000	674,500	29,813	....	....	104,813
1889	......	....	53,192	47,873	165,100	6,498	....	....	54,371
1890	......	....	70,427	73,948	*Nil.*	*Nil.*	....	....	73,948
1891	......	....	4,500	4,000	*Nil.*	*Nil.*	....	....	4,000
1892	......	....	77,160	66,935	808,420	33,064	....	....	99,999
1893	1,170	23,404	227,000	195,000	2,135,023	78,996	....	....	297,400
1894	6,252	125,014	746,379	470,219	5,662,523	169,875	324,680	16,234	781,342
1895	39,264	785,271	1,496,522	977,229	16,475,464	532,255	952,840	47,642	2,342,397
1896	62.259	1,244,180	3,135,343	2,100,689	24,199,977	721,384	3,818,556	190,926	4,257,179
1897	106,141	2,122,820	5,472,971	3,272,836	38,841,135	1,390,517	5,325,180	266,258	7,052,431
1898	110,061	2,201,217	4,292,401	2,375,841	31,693,559	1,077,581	7,271,678	874,781	6,529,420
1899	138,315	2,857,573	2,939,413	1,663,708	21,862,436	878,870	7,722,591	1,351,453	6,751,604
1900	167,153	3,453,381	3,958,175	2,309,200	63,358,621	2,691,887	9,997,080	1,615,289	10,069,757
1901	210,384	4,348,603	5,151,333	2,884,745	51,582,906	2,002,733	27,603,746	4,446,963	13,683,044
Total	840,999	$17,161,463	27,722,286	$16,534,554	257,664,464	$9,622,689	63,016,351	$8,886,527	$52,128,252

TABLE VII.—PRODUCTION IN DETAIL OF THE

DISTRICT.	YEAR	TONS.	GOLO—PLACER.		GOLD—LODE.		SILVER.		COPPER.	
			Ounces	Value.	Ounces.	Value.	Ounces.	Value.	Pounds.	Value.
				$		$		$		$
Cariboo										
Cariboo Division	1898		7,975	159,500						
	1899		9,000	180,000						
	1900		8,100	162,000						
	1901		**13,980**	**279,600**						
Quesnel "	1898		10,743	214,860						
	1899		9,665	193,300						
	1900		25,500	510,000						
	1901		**12,000**	**210,000**						
Omineca "	1898		750	15,000						
	1899		430	8,600						
	1900		626	12,527						
	1901		**955**	**19,100**						
Cassiar										
Atlin Lake Division	1898		3,750	75,000						
	1899		40,000	800,000						
	1900	300	22,500	450,000	120	2,479				
	1901		**15,000**	**300,000**						
All other Divisions	1898		1,615	32,300						
	1899		969	19,380						
	1900		750	15,000						
	1901	**8**	**1,140**	**22,800**	**5**	**103**	**82**	**46**		
East Kootenay										
Fort Steele Division	1898	1,971	850	17,000			69,780	38,623		
	1899	716	500	10,000			33,516	18,970		
	1900	86,868	500	10,000			960,411	560,303		
	1901	**62,934**	**630**	**12,600**			**718,451**	**402,333**		
Other Divisions	1899	18					1,627	921	397	69
	1900	94	15	300			2,219	1,295	2,147	348
	1901	**838**	**40**	**800**			**34,131**	**19,141**	**3,272**	**527**
West Kootenay										
Ainsworth Division	1898	1,728					167,147	92,515	203	24
	1899	3,760			91	1,888	268,165	151,781		
	1900	5,313			28	578	352,167	205,454		
	1901	**5,938**			**63**	**1,312**	**324,913**	**181,951**		
Nelson "	1898	52,762			3,823	76,459	692,367	383,225	1,955,083	235,196
	1899	58,302			16,569	342,308	483,659	273,751	1,370,513	239,840
	1900	94,378	30	600	31,612	653,106	109,870	64,098	36,929	5,979
	1901	**109,226**			**32,863**	**679,310**	**377,167**	**211,213**	**1,599,449**	**257,671**
Slocan "	1898	30,691			60	1,194	3,068,648	1,698,496		
	1899	21,507			14	284	1,891,025	1,070,320		
	1900	25,520			5	103	2,121,176	1,237,495		
	1901	**25,493**			**244**	**5,043**	**2,276,259**	**1,274,705**		
Trail Creek "	1898	111,282			87,343	1,746,861	170,804	94,539	5,232,011	629,411
	1899	172,665			102,976	2,127,482	185,818	105,173	5,693,889	996,431
	1900	217,636			111,625	2,306,172	167,378	97,648	2,071,865	335,435
	1901	**283,360**			**132,333**	**2,735,323**	**970,460**	**543,458**	**8,333,446**	**1,342,518**
All other Divisions (Revelstoke, Trout Lake, Lardeau.)	1898	621	552	11,040	346	6,923	121,510	67,256		
	1899	294	300	6,000	118	2,439	48,463	27,430	1,120	196
	1900	622	250	5,000	208	4,297	96,416	56,249		
	1901	**930**	**100**	**2,000**	**234**	**1,837**	**133,774**	**74,913**		
Lillooet										
	1898	900	2,130	42,614	260	5,200				
	1899	1,557	2,135	42,700	1,300	26,858				
	1900	5,713	1,845	36,905	2,497	51,588				
	1901	**4,150**	**1,301**	**26,080**	**1,079**	**22,303**				
Yale										
(Grand Forks, Kettle River and Osoyoos Divisions.)	1898	14,820	382	7,632	17,824	356,480				
	1899	13,084	180	3,600	11,086	229,028	2,719	1,539		
	1900	103,426			18,133	374,628	112,145	65,426	5,672,177	918,325
	1901	**396,210**	**250**	**5,000**	**37,388**	**772,810**			**14,511,787**	**2,337,849**
† Similkameen Div'n. (Vernon.)	1898		378	7,560						
	1899	1	330	6,600			16	9		
	1900		240	4,800						
	1901		**231**	**1,680**						
Yale Division (Ashcroft, Kaml'ps.)	1898		3,042	60,840						
	1899	538	3,736	74,720	2	45	47	27	1,700	297
	1900	580	2,877	57,542						
	1901	**3,374**	**2,272**	**45,140**	**18**	**370**	**74**	**41**	**39,920**	**6,431**
Coast and other Districts (Nanaimo, Alberni, W. Coast V. I., Victoria).										
	1898	1,159			405	8,100	2,145	1,187	84,381	10,150
	1899	14,901			6,159	127,241	24,358	13,787	654,972	114,620
	1900	14,346	703	14,050	2,925	60,430	36,393	21,232	2,193,962	355,202
	* **1901**	**27,965**	**600**	**12,000**	**6,152**	**127,162**	**71,483**	**41,710**	**3,115,872**	**501,967**
Miscellaneous (building stone, brick, etc., other metals, etc)	1898									
	1899									
	1900									
	‡ **1901**									
TOTALS	1898	215,944	32,167	643,346	110,061	2,201,217	4,292,401	2,375,841	7,271,678	874,781
	1899	287,343	67,245	1,344,900	138,315	2,857,573	2,939,413	1,663,708	7,722,591	1,351,453
	1900	554,796	63,936	1,278,724	167,153	3,453,381	3,958,175	2,309,200	9,997,080	1,615,289
	1901	**920,416**	**48,505**	**$970,100**	**210,381**	**$4,348,603**	**5,151,333**	**$2,884,745**	**27,603,746**	**$4,446,963**

* Iron Ore—Kamloops, 3,246 tons; Coast, 2,500 tons.

METALLIFEROUS MINES FOR 1898, 1899, 1900, AND 1901.

Lead.		Totals for Divisions.				Totals for Districts.			
Pounds.	Value.	1898.	1899.	1900.	1901.	1898.	1899.	1900.	1901.
	$	$	$	$	$	$	$	$	$
						389,360	381,900	684,527	538,700
		159,500							
			180,000						
				162,000					
					279,600				
		214,860							
			193,300						
				510,000					
					210,000				
				12,527					
					19,100				
						107,300	819,380	467,479	322,919
		75,000							
			800,000						
				452,474					
					300,000				
		32,300							
			19,380						
				15,000					
					22,919				
						133,368	66,294	2,215,560	1,592,663
2,286,603	77,745	133,368							
881,167	35,423		64,393						
38,494,077	1,639,848			2,210,151					
29,129,128	1,127,036				1,541,969				
22,653	911		1,901						
81,354	3,466			5,409					
775,016	30,226				50,691				
...						6,042,975	6,187,859	6,020,783	8,159,662
1,978,297	67,262	159,801							
3,588,577	144,261		297,930						
3,366,962	113,433			349,465					
3,788,412	117,748				331,011				
		694,880							
579,245	23,286		879,185						
1,485,899	63,299			787,082					
2,170,350	96,314				1,214,568				
27,063,595	920,162	2,619,852							
16,660,910	669,768		1,740,372						
19,565,743	826,310			2,063,908					
15,025,759	586,001				1,865,752				
		2,470,811							
			3,229,086						
1,045	45			2,739,300					
					1,621,299				
365,064	12,412	97,631							
129,884	5,221		41,286						
363,439	15,482			81,028					
391,844	15,282				97,032				
						47,814	69,558	88,493	48,383
		47,814							
			69,558						
				88,493					
					48,383				
						432,512	315,865	1,420,725	3,307,948
		364,112							
			234,167						
102	4			1,358,383					
2,397	93				3,250,986				
		7,560							
			6,609						
				4,800					
					1,680				
		60,840							
			75,089						
				57,542					
					52,282				
						19,437	255,648	450,914	682,839
		19,437							
			255,648						
				450,914					
					682,839				
						150,000	206,400	251,740	417,238
		150,000							
			206,400						
				251,740					
					417,238				
31,693,559	1,077,581					$ 7,322,766			
21,862,436	878,870						$ 8,302,904		
63,358,621	2,691,887							$ 11,600,221	
51,582,906	$2,002,733				15,070,382				15,070,382

†Platinum, in 1898, $1,500; in 1901, $457. ‡ Building Stone, Brick, &c., $400,000; Iron Ore, $17,238.

TABLE VIII.

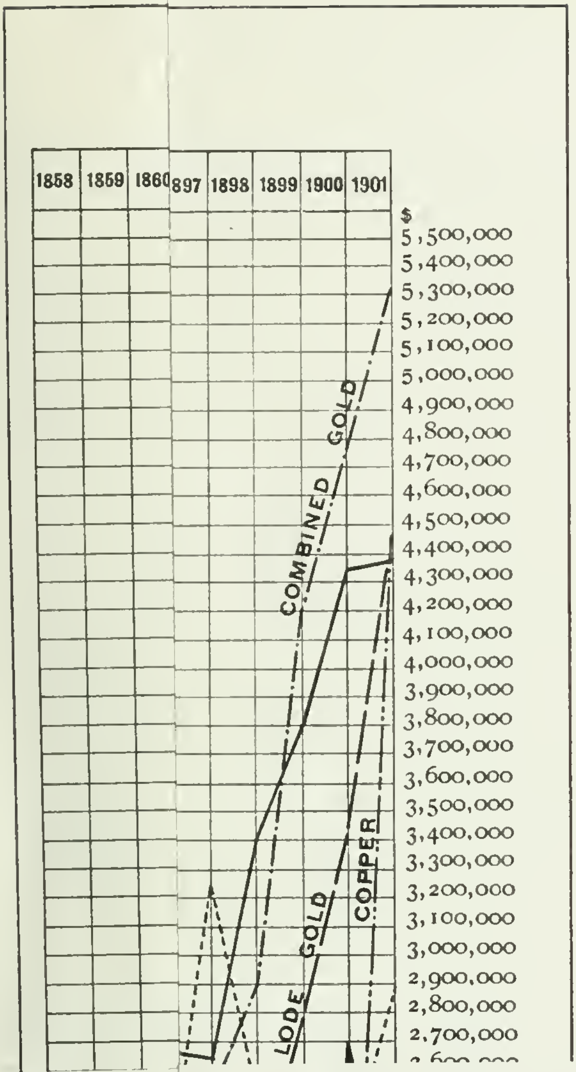
COAL AND COKE PRODUCTION PER YEAR TO DATE.

Coal.

YEARS.	TONS (2,240 lbs.).	VALUE.
1836-52	10,000	$ 40,000
1852-59	25,396	101,592
1859 (2 months)	1,989	7,956
1860	14,246	56,988
1861	13,774	55,096
1862	18,118	72,472
1863	21,345	85,380
1864	28,632	115,528
1865	32,819	131,276
1866	25,115	100,460
1867	31,239	124,956
1868	44,005	176,020
1869	35,802	143,208
1870	29,843	119,372
1871-2-3	148,549	493,836
1874	81,547	244,641
1875	110,145	330,435
1876	139,192	417,576
1877	154,052	462,156
1878	170,846	512,538
1879	241,301	723,903
1880	267,595	802,785
1881	228,357	685,071
1882	282,139	846,417
1883	213,299	639,897
1884	394,070	1,182,210
1885	265,596	796,788
1886	326,636	979,908
1887	413,360	1,240,080
1888	489,301	1,467,903
1889	579,830	1,739.490
1890	678,140	2,034,420
1891	1,029,097	3,087,291
1892	826,335	2,479,005
1893	978,294	2,934,882
1894	1,012,953	3,038,859
1895	939,654	2,818,962
1896	896,222	2,688,666
1897	882,854	2,648,562
1898	1,135,865	3,407,595
1899	1,306,324	3,918,972
1900	1,439,595	4,318,785
1901	1,460,331	4,380,993
Total	17,423,802 tons.	$52,652,930

Coke.

YEARS.	TONS (2,240 lbs.).	VALUE.
1895-6	1,565	$ 7,825
1897	17,831	89,155
1898 (estimated)	35,000	175,000
1899	34,251	171,255
1900	85,149	425,745
1901	127,081	635,405
Total	300,877 tons.	$1,504,385



Sh

Gold

Gold

Silve

Copp

Lead

Iron.

Nicke

Coal.

Coke.

Tc

TABLE

SHOWING MINERAL PRODUCTION OF BRITISH COLUMBIA

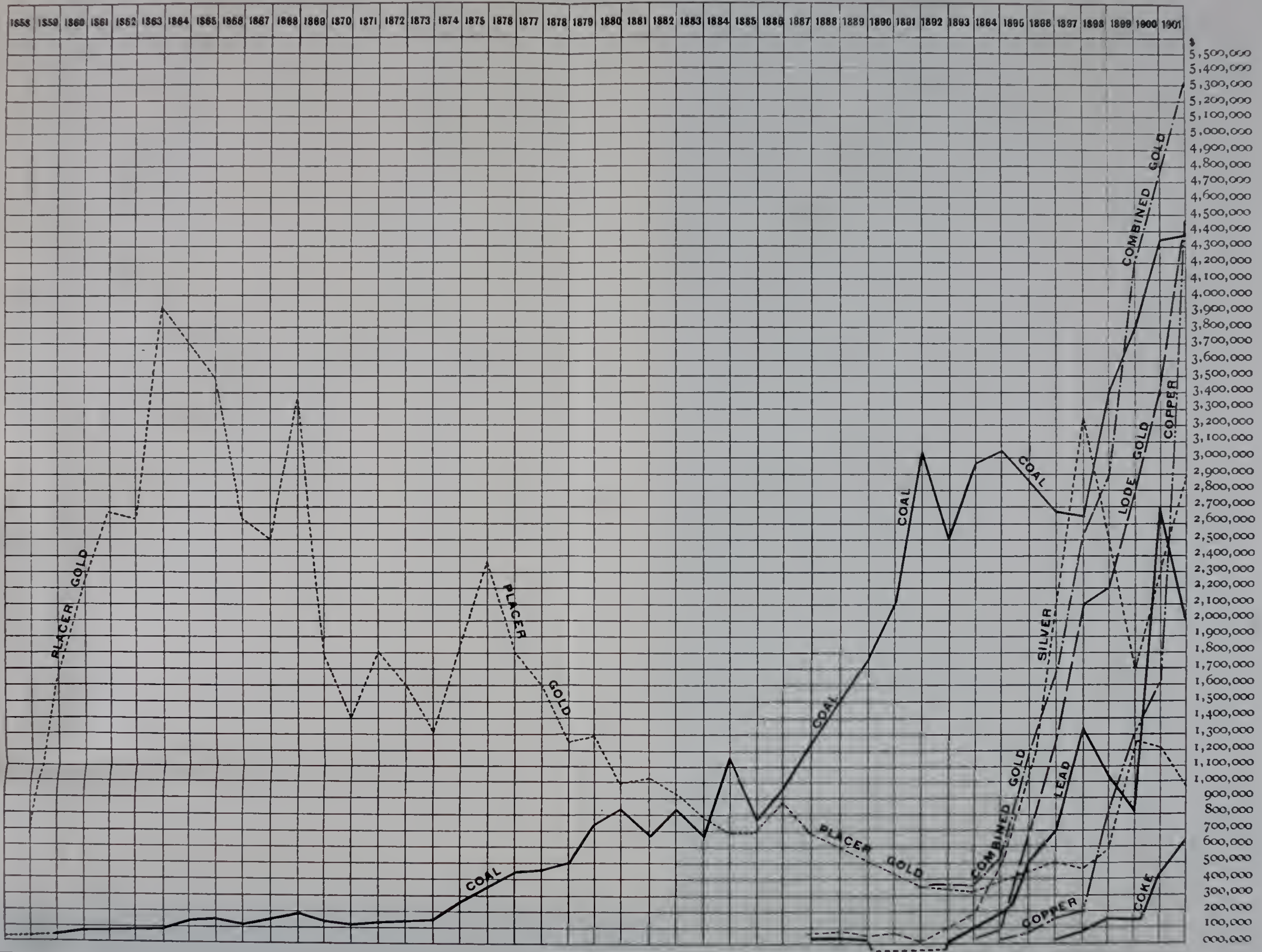
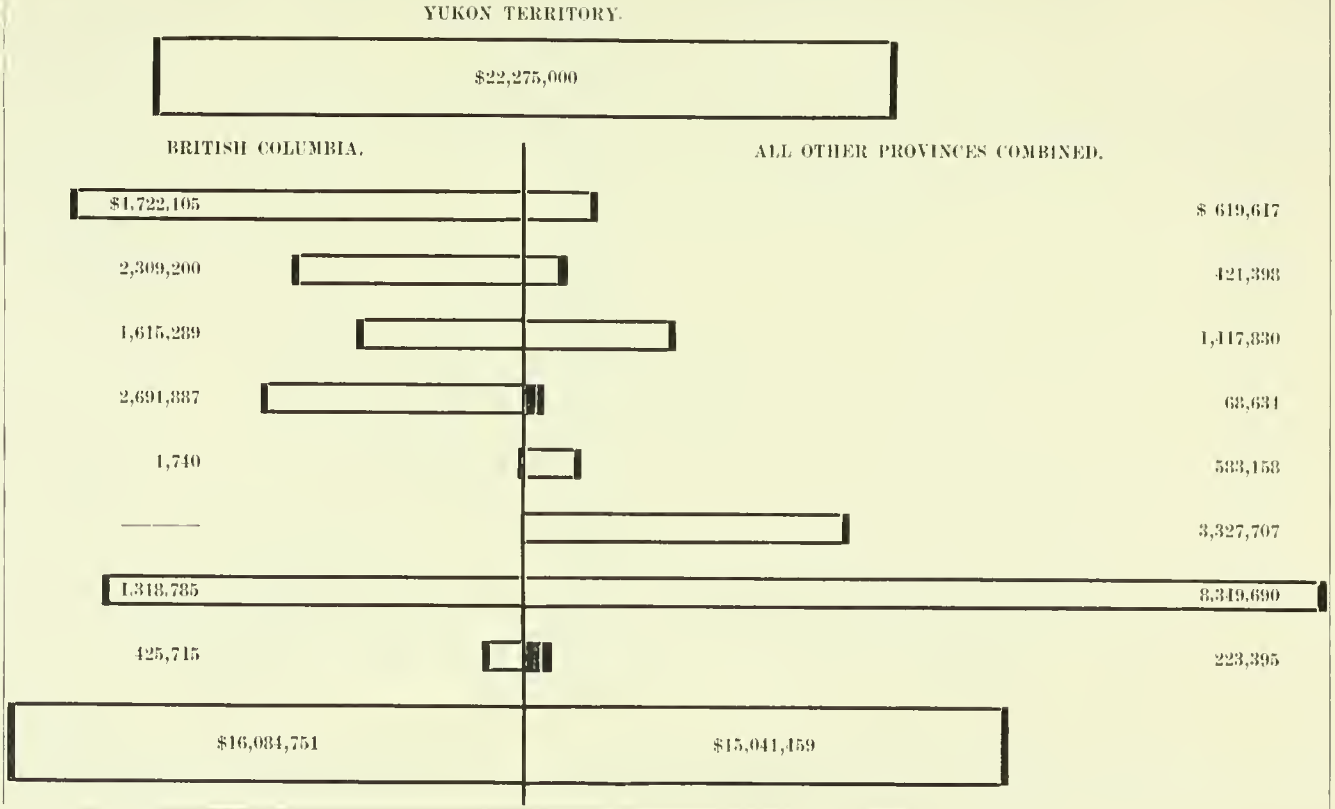


TABLE IX.

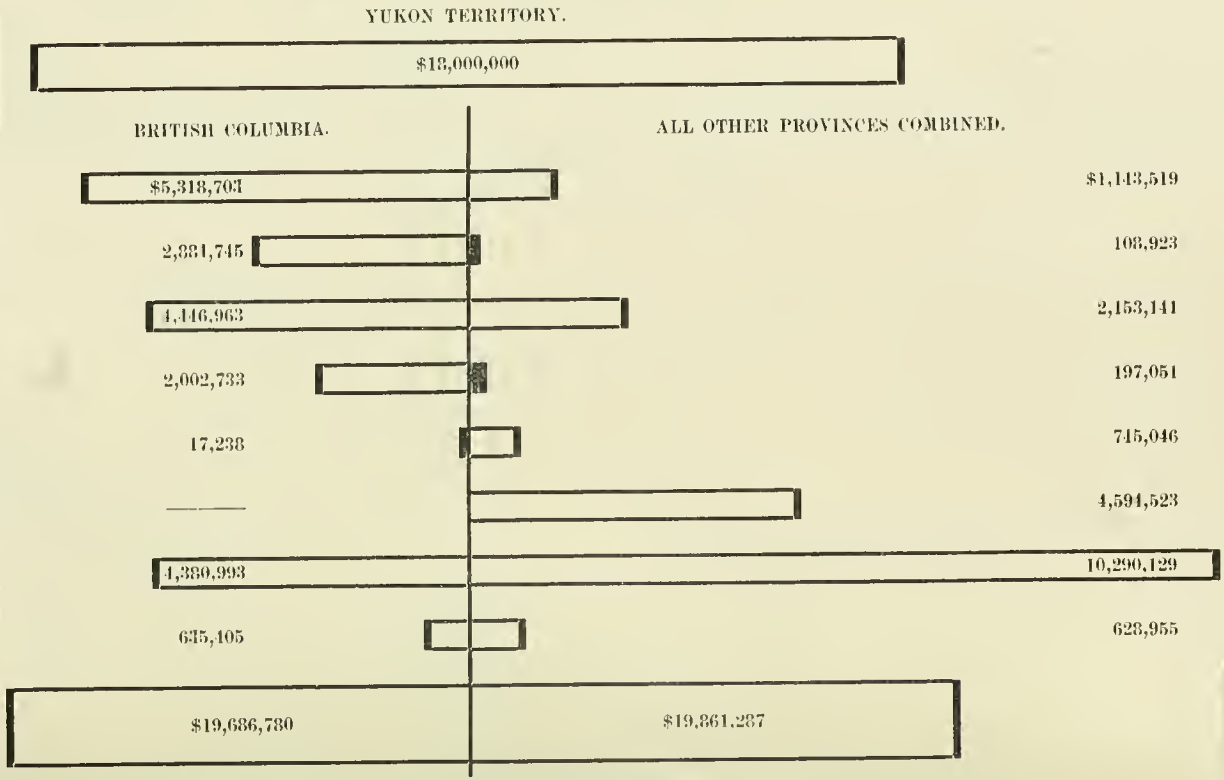
Showing Comparative Mineral Production for 1900 of British Columbia and Other Provinces of the Dominion.



	Dominion Total.	YUKON TERRITORY.	BRITISH COLUMBIA.	ALL OTHER PROVINCES COMBINED.
Gold	....	$22,275,000		
Gold	$5,411,752		$4,722,105	$ 619,617
Silver	2,730,598		2,309,200	421,398
Copper	3,063,119		1,615,289	1,447,830
Lead	2,760,521		2,691,887	68,634
Iron	584,898		1,740	583,158
Nickel	3,327,707		———	3,327,707
Coal	12,668,475		4,318,785	8,349,690
Coke	699,140		425,745	223,395
Total	....		$16,084,751	$15,041,459

TABLE X.

Showing Comparative Mineral Production for 1901 of British Columbia and Other Provinces of the Dominion.



	Dominion Total.	Yukon Territory.	British Columbia.	All Other Provinces Combined.
Gold	...	$18,000,000		
Gold	$6,462,222		$5,318,703	$1,143,519
Silver	2,993,668		2,884,745	108,923
Copper	6,600,104		4,446,963	2,153,141
Lead	2,199,784		2,002,733	197,051
Iron	762,284		17,238	745,046
Nickel	4,594,523		——	4,594,523
Coal	14,671,122		4,380,993	10,290,129
Coke	1,264,360		635,405	628,955
Total	...		$19,686,780	$19,861,287

PROGRESS OF MINING.

The mining industry has, during 1901, still maintained that rapid growth which has characterised it since the inception of lode mining some ten years ago. It is all the more gratifying to be able to make this announcement again this year, inasmuch as reports to the contrary have been so widely circulated that the impression that 1901 has proved a disastrous year has gained much credence, not only abroad, but even within our own borders. Statistics are the best refutation of this impression, and it is with much gratification that attention is drawn to the preceding statistical tables. These show that the value of the mineral production of this Province for the past year is greater than that of the Yukon; that we have in our mineral deposits a "Klondike" of our own, and a permanent and growing one at that. The Yukon is credited with an output of $18,000,000, while British Columbia produced $20,086,780.

Table I. gives the total values of the various mineral products of the Province up to and including the year 1901, showing the amount contributed by each mineral to make up the total of $172,241,988, the grand total of the Province's earned increment to the mineral wealth of the world. Gold still retains the first place in this list with a total production of $63,554,543, coal and coke following with a total production of $54,157,315.

Table II. shows the gross value of the mineral output for each year, and is particularly intended to illustrate the growth of the mining industry from year to year. From this it will be seen that in the last ten years the output has increased from $2,978,530 in 1892 to $20,086,780 in 1901, and this increase has been gradual and steady, the result of new properties added to the producing list each year, and the increasing development of the older properties.

The increases for each year from 1896 over that preceding are shown below:—

	Increase over preceding year.	Per cent. increase.
1896	$1,864,914	33
1897	2,947,312	39
1898	451,593	4⅓
1899	1,486,270	13⅔
1900	3,951,620	31 4/5
1901	3,742,029	23

The per capita mineral production of the Province for 1901 was $134.

Table III. gives in detail the amount and value of the various mineral products for the past three years. As compared with 1900 the production for 1901 shows, for—

Placer gold	a decrease of	27⅘ %.
Lode gold	increase of	26 %.
Silver	〃	25 %.
Copper	〃	175 %.
Lead	decrease of	25½ %.
Coal	increase of	1½ %.
Coke	〃	49 %.
Other materials	〃	22⅘ %.

Table IV. shows the gross value of the mineral products for the last three years produced by the various divisions and districts, and illustrates the growth of productive mining in the various parts of the Province.

Table V. shows the yearly production of placer gold since 1858, showing a grand total to date of $63,554,543. In this is included gold obtained by placer mining, hydraulicing and dredging.

Table VI. shows the production of the lode mines of the Province since 1887, which is the earliest period in which any lode mining was carried on, although it never amounted to anything appreciable until 1892.

While coal mining and placer mining are undoubtedly just as truly mining as is "lode mining"—and the production therefrom is just as truly a part of the mineral output—still, in the popular sense, the term "mining" is confined to lode or metal mining, and for this reason this table is most interesting as indicating the growth of such "mining" in the Province.

That this growth has been phenomenal is shown by the following figures:—

In 1894 the product of the lode mines was valued at $781,342, while in 1901 it has increased to $13,683,044, or nearly 18 times as much in eight years.

The product of these mines in 1901 is valued at $13,683,044, an increase over the previous year of $3,613,287, or equal to 36 %.

The tonnage of ore mined in 1897 was 169,362 tons; in 1898 it had increased to 215,944 tons, or about 27½ % increase over the previous year. In 1899 it was 287,343 tons, or equal to 33 % increase; in 1900 it was 554,796 tons, or 93 % increase; in 1901 it was 920,416 tons, or about 66 % increase over the previous year.

While this great increase in tonnage is chiefly due to the increased output of the mines previously working, still there have been a number of new shippers added to the list during the past year.

The following table shows the number of mines in each district which shipped during the past year:—

TABLE SHOWING DISTRIBUTION OF MINES SHIPPING IN 1901.

	No. of Mines Shipping.	No. of Mines Shipped over 100 tons in 1901.	MEN EMPLOYED IN THESE MINES.		
			Below.	Above.	Total.
CASSIAR:					
Atlin	1	....	1	....	1
EAST KOOTENAY:					
Fort Steele	4	4	173	63	236
Other Divisions	4	1	19	7	26
WEST KOOTENAY:					
Ainsworth	13	7	126	33	159
Nelson	11	8	282	211	493
Slocan	36	21	676	194	870
Trail	13	9	685	267	952
Others	8	2	39	27	66
LILLOOET	3	3	29	14	43
YALE:					
Osoyoos, Grand Forks and Kettle River	17	14	501	227	728
Yale-Ashcroft-Kamloops	2	2	21	19	40
COAST	7	7	184	150	334
Total	119	78	2,736	1,212	3,948

Of the non-shipping mines the statistics are very incomplete, as very few of them report to the Department, and most of them are still in the "prospect stage." Returns have been received, however, from 47 mines in the Province which did not ship in 1901, and show that these mines employed 374 men ; 227 below ground and 147 above ground.

Table VII. shows the product of the metalliferous mines of the Province, giving in detail the tonnage mined in each division, together with the quantities and values of each of the metals so produced.

Table VIII. gives the coal and coke production of the Province for each year from 1836 to date, showing a gross product of the value of $54,157,315.

Tables IX. and X. show, graphically, the mineral production of British Columbia for 1900 and 1901, as compared with the combined product of all the other Provinces for the same minerals during these years.

This shows that, of the total combined output of the various Provinces of the Dominion during 1901 (excluding the Yukon Territory), British Columbia produced—

82 % of the gold, 96 % of the silver, 67 % of the copper, 96 % of the lead,
2 % " iron, none " nickel, 30 % " coal, 50 % " coke,

and of the total of preceding minerals about 19½ %.

Surely British Columbia is entitled to be called the "Mineral Province of Canada."

COAL.

The coal mines of the Province have, during the past year, made an output never before equalled in their history. The gross output of coal was 1,691,557 tons, of which 221,226 tons were used to make coke, so that the net output for the year was 1,460,331 tons of coal and 127,081 tons of coke. This is equivalent to an increased production over 1900 of coal 1½ %, and of coke 49 %.

The sales of coal were as follows :

Sold for consumption in Canada	413,705 tons.
" export to United States	895,197 "
" " other countries	18,966 "
Total sales	1,327,868 tons (2,240 lbs.)

The total sales of coke amounted to 127,533 tons, of which 80,154 tons were sold for consumption in Canada, and 47,379 tons were exported to the United States. This output has been made from the collieries on Vancouver Island and those near the Crows Nest Pass. The detailed production of each colliery is shown in the reports of the Inspectors of Collieries. The coast collieries produced 1,261,744 tons of coal and 15,398 tons of coke. The Crows Nest Collieries produced 198,587 tons of coal and 111,683 tons of coke.

The conditions prevailing in these two districts are so different that they require to be noted separately.

In the coast collieries the output is limited by the market for the product, as these older collieries are better prepared to meet an increased demand. Of their product about 75 % was exported, chiefly to California and mostly as coal. With the completion of the two smelters now under construction on the coast, the market for coke should be materially increased next year.

The Crows Nest Collieries are as yet new, and their output is limited, not by the market, which is unlimited, but by the undeveloped condition of the collieries and the limited transportation facilities, difficulties which are being removed with all possible speed, and next year will undoubtedly see an enormous increase in the output of these collieries. Of their product about 60 % of the coal and 70 % of the coke was consumed in Canada, the remainder going to the United States. It has been a constant struggle for these mines to meet the demands made on them for fuel, and every endeavour is being made to increase the output. There have been many complaints that the local demand for fuel was being neglected to supply the export trade. This difficulty will be obviated as the development and equipment of the collieries is increased. The figures show where the output was sold, and it is certain that next year a far larger proportion of the coal produced will be exported, as it is evident from the demand that it is much better than any other that can be obtained in those States immediately to the southward of British Columbia.

It will be noted that while these collieries only turned out 198,587 tons of coal to be used as such, they converted 180,768 tons into 111,683 tons of coke, selling it as such, so that the actual amount of coal mined was 379,355 tons.

GOLD.

The statistics show that the gold production of the Province—including both placer and lode gold—for the past year was of a value of $5,318,703, which is an increase over that of 1900 of $586,598, or equal to about 12 % increase. This is the greatest gold production British Columbia has ever made. In 1900 the increase was 12½ % over the previous year, and the increase this year over 1900 is 11⅘ %, showing the growing importance of the gold output of the Province. This production is derived from placer mining, including ordinary placer work, hydraulicing and dredging, and from lode mining.

Placer Gold Mining.

The placer gold output for the year 1901 was $970,100—a decrease from the previous year of $308,624. This is accounted for by the fact that the Atlin production has again suffered a serious diminution; the ordinary placers are mostly worked out, and the hydraulic companies, which should have been at work making an output, have managed to get into litigation among themselves and with individual miners, so that the season was practically lost. It is hoped and expected that by next season the existing plants, and those now under construction, will be able to work and, if so, the output of the camp will certainly be doubled.

Hydraulicing.

The Cariboo District shows a considerably decreased production, which is due almost entirely to the small output of the largest company in the district, the Cariboo Consolidated, which, through shortage of water, was only able to work a part of the season. This shortage of water was occasioned by the sudden melting of the snow in the spring, leaving insufficient water for the latter part of the season. The snow usually retained on the mountains is, as a rule, a sufficient reserve supply to last through the season, but last year this all melted at once causing spring freshets and a dry summer season. The smaller companies in the district did well, and with a normal snowfall and spring all should make a very good showing next season.

A small output has been made from the Liard Division, but as last year was the first year of the operations of the hydraulic companies there, most of the work was preparatory and of the nature of development.

On the coast certain deposits of black sand have been worked to a profit, but have not made the output expected.

Dredging.

Dredging for gold, although it continues to receive much attention and large amounts have been invested in capital, has not as yet yielded any very material return or output. That the gold exists in the beds of many of the rivers in considerable quantities has been conclusively proved many times, but the difficulty seems to be to save it.

It might be pointed out that in every instance, as far as is known, the dredges operating in British Columbia work up stream, and it is very questionable if such a practice is best suited to the conditions here prevailing, or whether they should not, on the contrary, work down stream.

In most of our rivers dredging is done under the following conditions, viz.: a swift current, numerous boulders, fine, flaky gold to be recovered and, finally, a hard, undredgable and uneven bedrock.

It is submitted that, under these conditions, a dredge working up stream can not be expected to save or take up all the gold. The agitation of the river bed by the buckets is great, and the gold will and is bound to settle into crevices in the bedrock. A very small crevice may hold the profits of a month, from which, in a hard bedrock, it is impossible for a dredge to recover it. Any gold once raised and afterwards dropped is swept by the force of the current back of the dredge bucket and is consequently lost. On the other hand, in working down stream a "face" is formed, which will be more or less inclined; the gold is swept from the bedrock on to this inclined face of removable material, and would be taken up in a subsequent bucket load.

Lode Gold Mining.

Placer mining is, of necessity, dependent on the weather, and is as variable in this Province as that commodity, but in lode gold mining, as the mines develop, the production becomes as regular as the output of a manufacturing business, and it is to lode mining that the Province is indebted for its ever-increasing gold production. In 1901 the lode mines of the Province produced $4,348,603 in value of gold, an increase over the previous year of $895,222, or 26 %. When it is remembered that this increase follows an increase in 1899 of about 30 %, and in 1900 of 21 %, a fair idea may be formed of the development and growth of the industry. This great increase is due first and chiefly to the development of the Boundary District, but the increased tonnage of the Rossland and Nelson Districts has also had its effect. Approximately, this gold has been derived from—

Direct smelting of copper-gold ores	$3,474,738
Combined amalgamation and concentration	873,865
Total	$4,348,603

It may be said that no absolutely "free milling" gold property is working in the Province; they all carry sufficient values in sulphides to necessitate the saving of such.

SILVER.

The total amount of silver produced in 1901 was 5,151,333 ounces, valued at $2,884,745. This is an increase over the previous year of $575,545 in value. The silver production of British Columbia this past year has been affected in two ways and requires some explanation. Silver is derived from silver-lead ores and from copper ores carrying silver, with a small percentage of "dry" silver ores. In 1900, approximately 90 % of the silver produced was derived from silver-lead ores, probably including most of the "dry" ores, as they were chiefly smelted together and are impossible to separate in the statistics. This year there has been a falling off in the production of lead ores, and a consequent diminution of the silver production, which has, however, been more than offset by the greatly increased tonnage of the copper-silver ores.

As near as can be estimated, the copper-silver ores have this year produced 30½ % of the silver output. The production from "dry" ores, although proportionately small, has greatly increased, but it would be difficult, as before stated, to separate, with any degree of accuracy, this source of production from the others.

LEAD.

The production of lead was this past year 51,582,906 lbs., worth $2,002,733. This shows a decrease in value of $689,154, or about 25 % as compared with the production of 1900, but in fairness the comparison must not stop here; it must be remembered that in 1900 there was a phenomenal increase over 1899 of 206 %. The figures show, therefore, that the lead production of 1901, although showing a decrease as compared with 1900, shows an increase over 1898 of 86 %, and over 1899 of 128 %, and is still 25 % higher than the highest production of any year prior to 1900. The cause of the decrease is not attributable to the mines themselves, but to the condition of the market for lead ores—too large a question to go into here—which has temporarily rendered it unprofitable to mine large deposits of galena very low in silver. Reference is here made particularly to the lead ores of East Kootenay. The Slocan district has not been so seriously affected by the low price obtainable for lead ores, as the ores of this section carry much higher silver values, which has enabled them to be mined and marketed at a profit. As a matter of fact, the Slocan has this year just held its own as regards tonnage of ore mined and values produced.

COPPER.

Each year seems to present some particular feature of interest, and this year it is the greatly increased copper production of the Province. The copper production for the year has been 27,603,746 lbs. of "fine copper," valued at $4,446,963, an increase of 17,606,666 lbs., and $2,831,674 over that of the previous year, or about 175 % increase in value.

It may here be noted that the recent "break" in the copper market did not occur until the last month in the year, and as, in estimating the values as above, the average price for the year is employed, the value of the product has not been seriously affected.

This copper has been derived as follows:

Boundary district	14,511,787 lbs.
Trail (Rossland) 〃	8,333,446 〃
Coast 〃	3,115,872 〃
Nelson 〃	1,599,449 〃
Other districts	43,192 〃
Total	27,603,746 〃

The great increase has been due to the working of the exceedingly large and notoriously low grade copper ores of the "Boundary," which has been rendered possible by the material reduction made in the actual costs of smelting, which are authoritatively stated as having been reduced as low as $1.35 to $1.50 per ton, of ore. This low possible cost of the first smelting, now proven, has a wide effect on the future of the district and Province, as it brings within the limit of profitable ores many known deposits of great extent which it has been previously regarded as impossible to profitably treat.

IRON ORE.

It has to be recorded that, as yet, very little iron ore as such has been mined in the Province. There have been a few experimental shipments made and a considerable amount of development work carried on, but from the very nature of things iron ore to be handled at all necessitates an iron blast-furnace to treat it, which is, as yet, not an accomplished fact in British Columbia, and will not be until a sufficient development has been done to fully establish both the quantity and quality of ore supply to justify its erection.

The statistics show that 5,746 tons of ore were shipped, which, as before stated, were used for experimental purposes, or as a flux in smelting other ores.

OTHER MINERALS.

Platinum.

There has been a small quantity of platinum produced this year, about $457 worth, from the Similkameen District. This small output is occasioned by the fact that comparatively little placer gold mining has been going on in this district of late, and as the platinum is recovered with the placer gold, little has been produced. This metal has been again noted in the neighbourhood of Dease lake and on the Thompson river in the placer workings, but no record has been obtainable of any quantity having been saved.

Building Materials.

No reliable returns are available as to the production of the various building materials, including lime, brick, fire-clay, building stone, cement and tile pipes, and the amount credited to these materials in the statistics has been estimated—the estimate erring on the conservative side.

Lime and brick are produced locally in almost every district for home consumption, while on the coast an excellent lime, which has considerable sale abroad, is made from a marble. On the coast, too, a cement of very good quality is made, and supplies much of the local market. On Kootenay lake a coarsely crystalline marble quarry is being worked for building purposes. There are on the coast several first-class granite and sandstone quarries opened and doing a local trade. These quarries are so admirably situated as regards water transportation that there is a fair prospect of their becoming an important export industry. Fire-brick, drain pipes and tile are manufactured on Vancouver Island for home consumption.

GENERAL DEVELOPMENTS OF THE YEAR.

A general review only is here given, the details of work in each district being found in the body of the Report under the proper head.

In the Atlin District, as already stated, the results this past year have not been satisfactory. As was noted in the Report last year, this camp was in the transition stage from ordinary placer mining to hydraulic methods, and it was expected that at least two or three of the hydraulic companies would be in operation during the season of 1901. That such expectations have not been realised is due largely to the friction, which was probably inevitable, between the individual miners and the large hydraulic companies. The owners of individual placer claims have rights which must be respected, and their holdings must not be buried under hydraulic tailings; but at the same time it is a notorious fact that a number of these individual claims, which are worthless as placer claims, are being held simply to embarrass the large companies in the hope of being "bought off." It is not to be taken as implied that all are thus acting unfairly, but many undoubtedly are, and the only apparent remedy is the strict application of the law that calls for continuous representation. It has been suggested that many of the disputes occurring could have been settled by the Gold Commissioner if he was given the requisite power. Such suggestions fail to take into account the limitation of the powers of the Province by the B. N. A. Act, and the decision of the Courts that the Province can confer only ministerial powers and not judicial powers upon its officers.

The existing hydraulic companies have also delayed matters by mutual disagreements, ending in litigation, where a slight application of the principle "live and let live" would have rendered a compromise possible. It is to be expected that these troubles have largely worn themselves out, and that 1902 will see legitimate work proceeded with.

The continued prospecting of the benches has been encouraging, and such work as was done by the hydraulic companies gave most hopeful indications. There does not appear to have been any new placer ground of importance opened up in this section, while the reports from the Chilkat Division indicate that the new discoveries of last year have deep bed-rock, and they have not so far proved profitable; it is only fair, however, to say that the past summer was so wet that flood-water prevailed in the creeks most of the short open season, preventing satisfactory work. As is the rule, when the individual placer claims began to give out last year, the prospecting for lode mines really began in this section, with the result that a number of very promising prospects have been recorded and received some slight development. It is as yet premature to state how important these will eventually prove to be, but so far they promise well.

In the Teslin Lake Division there has been considerable prospecting going on, but the reports so far received have not told of much success.

In the Liard Division the placer ground of the earlier days has been receiving considerable attention from hydraulic companies. The only company sufficiently far advanced to speak of with any certainty has made a promising showing by its development work.

In the Skeena Division there has been an unusual amount of prospecting for lode mines, which certainly has so far demonstrated that this section is well worthy of very serious investigation.

In the New Westminster Division prospecting and development work has been proceeded with, but as yet no serious shipments have been made. The immense showing of low-grade concentrating copper ore at Howe sound is reported as sold for a large amount, but so far no steps have been taken to do actual mining, a fact much to be regretted.

On Texada island the copper properties have about held their own, but in certain of the companies operating here the financial management has been such as to bring the values of the properties themselves into question—matters which are in no way related. The iron deposits on this island have been seriously developed during the past year, but, as already stated, the market for iron ore does not at present exist. The same may be said of the iron deposits in the neighbourhood of Barkley sound, on the west coast of Vancouver Island.

On Vancouver Island coal is, of course, the important product—this will be referred to elsewhere.

The copper properties at Mt. Sicker have been seriously developed and worked, making a very fair output. Each of the important properties is so satisfied with the amount of ore in sight that it is now engaged in erecting a smelter. If arrangements could have been made for one smelter to treat all the ores of this Camp, it would have been better for all concerned, and would have effected great economies in the working costs, matters which, at the present price of copper, cannot be neglected.

In the Alberni Division the two copper properties on the Alberni canal have been worked continuously during the past summer, and both have put up wire rope tramways from the mines to their docks at deep water. Since the drop in the price of copper shipments have been discontinued until it rises again. These properties carry practically no gold or silver, and so are more seriously affected by the fluctuations of the copper market than are most of the copper properties in the interior of the Province.

In the West Coast of Vancouver Island Mining Division there has been a falling off in the general development, but work has been pretty steadily carried on at Sidney inlet by a Scotch syndicate, on the property of which there is reported to be a fine showing of bornite copper ore. This property is, however, being developed under adverse circumstances, and with a very limited available capital.

In East Kootenay the chief advancement has been in the Crow's Nest Pass collieries. These properties have taken up definite lines of development with ample foresight as to the probable future demands to be made upon them. The output made during the past year can be seen from the statistics. That it will be doubled next year there is little doubt, owing to the demand for this coal and coke and the developments undertaken by the Company.

Last year the output of low-grade silver-lead ores in the Fort Steele Division was the feature of this district; this year this production has been very seriously diminished.

These ores carry only about 50 ounces of silver to the ton of metallic lead, and as the market for lead ores has been so extremely low this past year it has not been profitable to work many of the properties. The cause of this low price of lead is largely due to the withdrawal from this district of the purchasers for the American lead smelters, caused by the changed conditions of smelting in the U. S., whereby a much smaller amount of lead ore is needed for fluxing purposes.

This fact has been practically recognised by the Dominion Government, which has endeavoured to stimulate the erection of a lead refinery in Canada by granting a bonus on all lead refined in the Dominion, which means British Columbia, as all the lead mined in Canada is mined in this Province. Already the Trail Smelter has a lead refinery under construction, which should be in operation this coming year, and it is expected that this will give at least some relief.

The Slocan has suffered by reason of the condition of the lead ore market as has East Kootenay, though not to such an extent, and the output has not been seriously affected. There have been few new shipping properties in this district this year.

In the Goat River Mining Division there have been developed this past year large deposits of iron ore, and deposits of a similar nature are reported from Fort Steele, but no development work has been done here as yet. Should these properties prove as large as is expected, and being in such close proximity to the coal and coke supply, there will be every reason to expect the erection of an iron blast furnace in the near future.

In the Nelson Division, the mines around Ymir have made an increased output, and the prospects for the future are exceedingly encouraging.

The *Silver King* (Hall Mines), after a year devoted to development, has again become a shipping property.

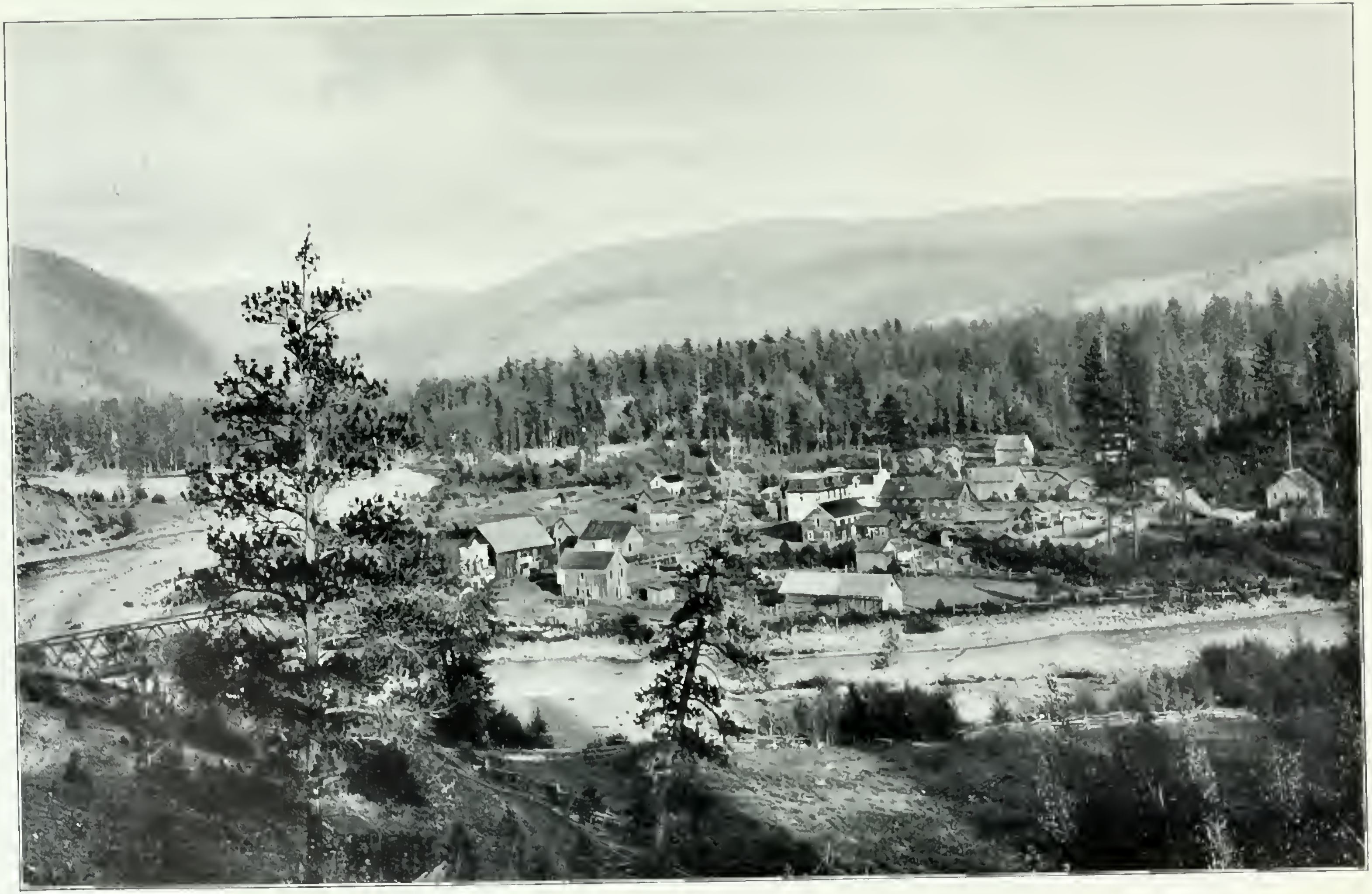
In the Trail Division (Rossland) the big mines have grown bigger, and although there have been several temporary stoppages caused by labour disputes, which now happily seem almost adjusted, the output, in spite of this, has been materially increased. The workings here have attained a depth of from 1,000 to 1,200 feet, and prove the continuity with depth of the ore-bodies of the camp. The grade of the ore has been fairly well maintained with depth, although, in many instances, owing to the reduced costs of smelting, etc., it has been found economical to now treat much ore of a grade which previously would have gone over the dump. The returns would apparently indicate a considerable drop in assay value, but the above fact accounts for the greater part of such apparent decrease in the value of the ore.

The Boundary District has this past year attracted more attention than any other part of the Province. For years it has been recognised as a fact that this district contained tremendously large bodies of ore, but it has also been admitted that the values of such ores approached so near that line which divides profit from loss that it has been a very serious question as to just which side of the line they would finally be placed. The question was one entirely dependent on the economies which could be brought about in mining and smelting, and in the handling of a large output. It is authoritatively stated that certain of the larger properties have reduced the cost of mining to about $1 per ton, and the cost of matting the ore to from $1.35 to $1.50 per ton. On such figures as these there is a fair margin of profit on most of the ores of the district, and it is a matter of much importance to this section that such results have been obtained, as it renders of value many deposits at present unworked. At the same time, it must be recognised that such low working costs are only possible after the expenditure of immense amounts of capital and by treating a large tonnage. The returns of the smelters of the district and detailed reports are necessary to form any correct idea of the prevailing conditions.

In the southern part of the Yale District prospecting has been greatly stimulated this past two years by anticipation of a railway through this section. As a result, it has been shown that there are two or three highly mineralised belts traversing this district. Of the locations made and on which development has been satisfactory a majority show ore in which copper is the metal of chief value, but it is usually accompanied with fair values in precious metals. There are, however, several properties, notably near 20-Mile creek, in which the ore is iron sulphides—generally arsenical—carrying high gold values.

From the neighbourhood of Princeton northerly to Nicola there is a zone highly mineralised with copper on which some development has been done of a preliminary nature—which the advent of a railway will greatly stimulate. These properties will certainly be low grade, and as there seems to be a large mineralised area it will require extensive development to prove the ultimate value of the camp.

There have been several coal locations made in the various parts of this district, the more important being in the vicinity of Princeton and Nicola, where very considerable and important beds have been proved which are referred to in detail elsewhere.



TOWN OF PRINCETON AT FORKS OF SIMILKAMEEN AND TULAMEEN RIVERS.

DEPARTMENT OF MINES.

WORK OF THE YEAR.

The following is a brief summary of the work of the Department, in addition to the regular routine:—

Provincial Mineralogist. The first two months of the year were devoted to compiling statistics and preparing the Annual Report of the Department, which went to press on March 11th, but owing to excess of Sessional work was not finished printing until the latter part of June.

On June 27th the Provincial Mineralogist left for Vernon, proceeding thence by pack train over the Monashee pass to the headwaters of the Fire valley, thence to the headwaters of the main Kettle river, which stream was followed down as far as Rock creek, side trips being made up the various tributaries, particularly the West fork, a detail track survey being made of all this country, of which there were no published maps.

From Rock creek the party proceeded to Camp McKinney, thence over the range to Fairview, and after a delay here of a few days, on to Keremeos; thence, following up Olalla creek to the Nickel Plate waggon road, on to 20-Mile creek and the mines in that locality.

From the Nickel Plate the trail was taken to Hedley, and the Similkameen valley followed up to Princeton. From Princeton the Similkameen river was followed to its source at the summit between it and the Skagit, the party then returning to Princeton.

From Princeton the party proceeded to Granite creek and Tulameen; thence by waggon road to Aspen Grove and the various properties in that section, then on to Nicola, and from thence *via* Guichon creek and Fish lake trail to Kamloops, and from there, in accordance with instructions previously received, to Victoria, arriving on October 1st.

The total distance travelled in the saddle, including side trips, is estimated at from 900 to 1,000 miles.

The remainder of the year was spent in preparing field-notes, office work and an Examination of Assayers.

In November numerous enquiries were received as to reported discoveries of placer gold on the Horsefly. It being then too late in the season to make a personal investigation, all available information was gathered from the Gold Commissioner and Mining Recorders, and a pamphlet containing such information, accompanied by a specially corrected map of the section, was issued.

There being then no Minister of the Department, the regulations and forms for the Coal Miners' Examination were prepared for the Executive and monthly examinations arranged, which seem to be now running smoothly and giving general satisfaction.

There has been an urgent demand for some approximate but official estimate of the production of the year to be issued immediately on the close of the year, and before statistics are available. Data was, therefore, carefully collected and such estimate—to end of calendar year—made on January 15th. Estimates of this sort are dangerous, if purporting to be more than estimates; but this was very carefully pointed out in a letter to the Acting Minister, who authorised this publication. It is interesting to note how close this estimate has proved to be to the figures of the actual statistics.

	Estimated Value.	Value from Statistics.	Approximate % error of Estimate.
Gold	$5,596,700	$5,318,703	+ 5 %
Silver	2,624,002	2,884,745	− 9⅓ %
Copper	4,951,698	4,446,963	+ 11⅓ %
Lead	1,970,641	2,002,733	− 1½ %
Coal	4,587,630	4,380,993	+ 4 3-5 %
Coke	673,000	635,000	+ 6 %
Total	$20,404,471	$19,669,542	+ 3 4-5 %

Assay Office.

The following is a summary of the work of the Assay Office, as reported by the Provincial Assayer:—

During the year some 892 assays, or quantitative determinations were made, being a slight increase over the previous year, including a number for the Department of Mines for which no fees are shown. The receipts were as follows:—

Fees for ordinary assays	$ 596
" gold bullion assays	353
" from students	100
" from assayers' examinations	630
Value of work done for other Departments and not charged for	250
Total	$1,929

Free Determinations.

In addition to the above, a large number of qualitative determinations were made of mineral and rocks sent in to the Department for identification and classification. For this latter work no fees were charged, in accordance with the established custom of the Department. As has been already noted in the Reports, all such qualitative determinations are made free of charge with the idea of assisting prospectors and others in the search for new minerals or new mineral districts. With the exception of work for the Department, however, fees have been charged for all assays, *i. e.*, quantitative determinations of the value of economic minerals, as it is held that for the Government to do commercial assaying for anything less than the regular fees charged by assayers throughout the Province would be interfering with the business of those legitimately practising. It is felt that, if the fees charged by the Government are not less than those charged by private assayers, no financial harm is being done to these, while, on the other hand, it affords the public an opportunity of having their work checked by the Government office, which must, of course, be entirely disinterested. In many parts of this country the local assayer is more or less interested in prospects in the section in which he resides and would-be purchasers prefer to have their assays made by some one elsewhere who can have no interest either in the property or in the fees charged.

Gold Melting and Assaying.

The value of gold melted and for which Provincial Government assay certificates were issued during the year 1901, was $388,022, of which 158 lots, valued at $290,000, were assayed at Victoria and 88 lots, $98,022, at a branch office maintained in Vancouver before the establishment of the Dominion Government assay office.

Rebate of Royalty on Yukon Gold.

This large increase over any previous year in the amount of gold melted and assayed is principally due to an arrangement made with the Dominion Government by which the Government of British Columbia was authorised to pay to miners a rebate of 1% of the value of all gold mined in the Yukon and brought to the Provincial Assay Office, provided a royalty receipt could be shown; in other words, the miner may obtain a rebate of 20% of the royalty paid by him in the Yukon, in accordance with the regulations of the Dominion Government, by leaving his gold in Canada instead of taking it to the United States.

Again, the Provincial Government at Victoria, within 24 hours of its receipt, pays in cash the full mint value of all gold dust brought in, enabling the miner to continue his journey, if he so desires, with very little delay and, furthermore, men arriving from the Yukon without ready money are enabled, by producing their receipt showing that they have deposited a certain amount of gold dust with the Provincial Government for assay, to obtain an immediate advance from any of the local banks.

All gold bars are assayed independently by two assayers who check one another, so that the depositor is assured that he will obtain the highest possible value for his gold dust.

A more widespread knowledge of the above advantages cannot fail to bring an even greater amount of work to the Government Assay Office during the coming season, and will induce miners to remain in Canada who would otherwise go directly to the United States with their gold dust.

To handle the increased work during the past year two extra bullion furnaces were installed which, together with the melting plant previously in use, were found sufficient. In the laboratory another button balance and additional parting apparatus were placed, thus enabling the work to be carried on more expeditiously. A fine bullion balance was also provided for the weighing room, so that the weight of bars can be carefully checked with the Treasury Department.

During the year gold dust has been received from widely separated localities, principally, of course, from the Yukon, but also from Atlin, Omineca, Cariboo, Similkameen and the Kootenays.

A considerable number of samples of water, intended for drinking purposes, were examined during the year, and analyses were also made of certain mineral waters, to which reference will be found elsewhere.

Asphaltum from Queen Charlotte island was examined and found to be of good quality.

The large amount of gold bullion handled by the small staff of the Assay Office during the year prevented the carrying out of certain experimental work which had been contemplated.

The Provincial Assayer reports that no new finds of platinum have been made, though several samples of black sand have been examined. Notices have appeared lately in the mining press of a discovery of platinum in Wyoming; this is announced as being the first discovery of the kind in America. The Provincial Assayer wishes to point out, however, that he found platinum in a fine basaltic rock during the year 1895, and made mention of it in the annual Mines Report of that year. The platinum appeared to be in the form of fine wire-like threads through this rock.

Six students availed themselves of the use of the laboratory during the year, and of this number three successfully passed the examination for licence to practise assaying in British Columbia.

Mineral Museum.

During the year the Museum has been well patronised by prospectors and general visitors. Owing largely to the exertions of the Provincial Mineralogist the cases are being filled with specimens; the northern portions of the Province are still, however, poorly represented. Several small cases and a number of samples of British Columbia ores have been sent away; these should not only be instructive but attract attention to our resources.

In addition to his usual duties the Provincial Assayer visited the principal properties in Nanaimo Mining Division, and also ascended the Skeena river as far as Kitsalas canyon; a portion of Queen Charlotte island was also examined.

ASSAYERS' EXAMINATION.

REPORT OF THE SECRETARY OF BOARD OF EXAMINERS.

SIR,—I have the honour to submit my annual report as Secretary of the Board of Examiners for Certificates of Competency and Licence to Practise Assaying in British Columbia, as established under the "Bureau of Mines Act Amendment Act, 1899."

The Act referred to requires that at least two examinations shall be held in each year, and these duly took place in the Government Laboratory, Victoria, beginning on the 25th March and 18th November, 1901, respectively.

The Lieutenant-Governor in Council was pleased to appoint as Special Examiners, J. Cuthbert Welch, Licensed Assayer, of Trail, W. J. Sutton, and T. Rhymer Marshall, D. Sc., F. C. S., M. E., of Victoria.

At the Examination which began on the 25th March, 9 candidates presented themselves for examination, and of these 6 passed successfully. At the Examination which began on the 18th November, 8 entered and 4 were successful.

Besides these two regular Examinations, a special Examination, beginning on the 15th April, was held at Nelson for the convenience of assayers residing in the Kootenays. Messrs. W. F. Teetzel & Co., of Nelson, dealers in Assayers' supplies, equipped a laboratory for the special use of the Board at this Examination, only charging for such apparatus as was broken or rendered useless. The thanks of the Board were duly tendered to Messrs. Teetzel & Co. for their courtesy in this matter. At this Examination 15 candidates presented themselves, and of this number 8 passed successfully and have been granted certificates.

With regard to exemptions from examination under section 2, sub-section (2), of the Act, the Board of Examiners instructed the Secretary to write to a number of the schools and colleges for the syllabus of their course of instruction in assaying, and also, where possible to obtain them, for the examination papers of the past few years. Such syllabi and examination papers as were received were placed before the Board and received careful consideration, together with the applications of such candidates as were affected thereby.

The Board recommended the granting of ten certificates under sub-section (2) during the year.

List of Assayers holding Provincial Certificates of Efficiency under the "Bureau of Mines Act Amendment Act, 1899," on January 1st, 1902.

Only the holders of such certificates may practise assaying in British Columbia.

Under section 2, sub-section (1)—

Austin, John W.	Vancouver.
Ayres, D. A.	Trail.
Bishop, Walter	Vancouver.
Campbell, Colin	Nelson.
Carmichael, Norman	Nelson.
Church, George B.	Nelson.
Clarke, Roy H.	Rossland.
Cobeldick, Wm. M.	Vancouver.
Comrie, Geo. H.	Vancouver.
Collinson, H.	Victoria.
Davis, A. B. C.	Greenwood.
Day, Athelstan	Vancouver.
Dedolph, Ed.	Kaslo.
Farquhar, J. B.	Vancouver.
Haseltine, R. S.	Rossland.
Hawkins, Francis	Nelson.
Kitto, Geoffrey B.	Victoria.
Marsh, Richard	Rossland.
Marshall, Wm. Stone	Duncans.
Nicholson, Ch. F.	Peterboro.
O'Sullivan, John	Vancouver.
Perkins, Walter G.	Grand Forks
Pickard, T. D.	Fairview.
Robertson, Thomas R.	Albert Canyon.
Segsworth, Walter.	Nelson.
Sim, Charles John	Victoria.
Snyder, Blanchard M.	Spokane, Wash.
Snyder, Wm. D.	Vancouver.
Sundberg, Gustave	Greenwood.
Tally, Robert E.	Trail.
Tretheway, John H.	Kaslo.
Vans Agnew, Frank	Nelson.
Wales, Roland T.	Trail.
Watson, Wm. J.	Van Anda.
Welch, J. Cuthbert.	Trail.
Whittaker, Delbert E.	Victoria.
Widdowson, E. Walter.	Trail.
Williams, W. A.	Grand Forks.
Wilson, C. M.	Sandon.

Under section 2, sub-section (2)

Archer, Allan	Ymir.
Bryant, Cecil M.	Vancouver.
Blaylock, Selwyn G.	Fernie.
Clothier, Geo. A.	Moyie.
Cole, Arthur A.	Rossland.
Coulthard, R. W.	Fernie.
Cowans, Fred.	Silverton.
Dixon, Howard A.	Toronto, Ont.
Galbraith, M. T.	Greenwood.
Gilman, Ellis Philip	Vancouver.
Green, J. T. Raoul.	Nelson.
Guess, Geo. A.	Greenwood.
Gwillim, J. C.	Nelson.
Heal, John H.	Nelson.
Hilliary, G. M.	Phœnix.
Holdich, Augustus H.	Revelstoke.
Johnson, William Steele.	Slocan.
Kaye, Alex	Atlin.
Lay, Douglas.	Cranbrook.
Lewis, Francis B.	Grand Forks.
Merrit, Charles P.	Grand Forks.
McArthur, Reginald E.	Rossland.
McFarlane, James	Vancouver
McLellan, John.	Rossland.
McVicar, John.	Ymir.
Mussen, Horace W.	Nelson.
Outhett, Christopher.	Kamloops.
Shannon, S.	Ferguson.
Stevens, F. G.	Rossland.
Thomson, H. Nellis.	Trail.
Watson, A. A.	Vernon.
Watson, Henry.	Vernon.
West, Howard.	New Denver.

Under section 2, sub-section (3)—

Carmichael, Herbert (Provincial Assayer).	Victoria.
Harris, Henry	Nelson.
Kiddie, T. (Supt., Smelter).	Van Anda.
Marshall, Dr. T. R.	Victoria.
McKillop, Alexander.	Nelson.
Pellew-Harvey, Wm.	Vancouver.
Robertson, Wm. F. (Provincial Mineralogist).	Victoria.
Sutton, Wm. J.	Victoria.

Previously issued under the "Bureau of Mines Act, 1897," section 12.

Pinder, W. J. B.	Atlin.
Thompson, James B.	Alberni.

EXAMINATION FOR COAL MINE MANAGERS.

Under the provisions of the "Coal Mines Regulation Act," the manager having control and daily supervision over any coal mine in the Province must hold a certificate of competency issued under such Act.

The following is from the Report of Mr. Thomas Morgan, Inspector of Mines, Nanaimo, and Secretary of the Board of Examiners:—

SIR,—I beg to forward my Annual Report as Secretary to the Board of Examiners for Certificates of Competency as Coal Mine Managers, appointed under section 34 of the "Coal Mines Regulation Act."

An examination under and in conformity with the Act was held on August 1st, 2nd and 3rd, 1901. The examination papers were prepared by the Board in advance, and sealed copies sent to the Inspectors of Coal Mines at Fernie and Nanaimo.

These papers were opened simultaneously and in a given order by the Inspectors, and identical examinations were held at the same time in these two centres, the answer papers to the questions set being all returned under seal to the Central Examining Board for correction and marking.

At this examination some thirteen candidates presented themselves, and of this number six were found to have passed examinations satisfactory to the Board, and were recommended to be granted Certificates of Competency. The following are the names and addresses of the successful candidates:—

Benjamin Browitt, Nanaimo,
Thomas Stockett, Jr., Fernie,
Robert Pearson, Fernie,
John Cunliffe, Extension,
Robert B. Lamb, Fernie,
Daniel Evans, Michel.

The highest marks obtained by any of the above candidates was 88.6 % of the total marks given for the whole examination.

As to the general scope and character of the examination set by the Board, I would report as follows:—

The examinations were all written, and were on the following subjects:—British Columbia Mining Act, Mine Gases, Mine Ventilation, Machinery, Surveying, General Mine Work.

The Board demands that a successful candidate shall obtain, as a minimum mark, 70 % of the total marks in each of the first three subjects, and 50 % in each of the last three subjects, and that he shall obtain at least 70 % of the total marks obtainable for the whole examination. I append copies of the papers set at the last examination as giving an idea of the scope of such.

COAL MINE MANAGERS' EXAMINATION PAPERS.

B. C. Mining Act. Time, 3 hours.

1. Under what conditions are single shafts prohibited?

2. What are the exemptions from provisions as to single shafts?

3. What are the provisions required by the Act for man-holes on underground planes worked by engines, windlass or gin, and on which persons travel?

4. What are the provisions required by the Act for man-holes on underground roads where the load is drawn by animals, and on which persons travel?

5. How long may a mine be worked without there being a certificated manager in charge? What is the penalty, and what are the exemptions?

6. What are the powers of Inspectors?

7. What are the requirements of the Act as to precautions to be taken before blasting in a dry and dusty place?

8. What do the special rules state as to riding on full or empty cars in the mine?

9. What persons are authorised to examine safety lamps without prejudice to the appointment of any other competent person for that purpose?

10. What are the duties of the pitheadman or banksman?

11. What are the duties of the engineman?

12. What are the duties of the overman?

13. What are the duties of the fireman?

14. What are the duties of the shotlighter?

Mine Gases. Time, 3 1-2 hours.

1. Of what is the atmosphere composed?

2. What is light carburetted hydrogen? Give symbol and specific gravity; where found, and under what condition is it dangerous to human life?

3. What is carbonic acid gas? Give symbol and specific gravity; where found, and under what condition is it dangerous to human life?

4. What is carbonic oxide? Give symbol and specific gravity; where found, and under what condition is it dangerous to human life?

5. What is sulphuretted hydrogen? Give symbol and specific gravity; where found, and under what condition is it dangerous to human life?

6. What is fire damp?

7. What is after damp, and of what composed?

8. Does the temperature at which sulphuretted hydrogen ignites call for any special attention when safety lamps are brought into its presence?

9. Is there any danger likely to arise from the sudden or violent application of pressure to the atmosphere of a mine which is giving off a large amount of explosive gas, though not ordinarily in an explosive condition?

10. Does coal dust, when suspended in the air, give the air explosive properties?

11. Is a naked light, such as a candle or torch, sufficient to ignite a high charge of coal dust in a dry atmosphere?

12. Is there any danger attending the removal of a large body of fire damp in a dry mine by a strong current of air? If so, what?

13. What do you consider the best method or methods of eliminating danger from coal dust in mines?

14. What course would you pursue in endeavouring to resuscitate a person overcome by mine gases?

Ventilation. Time, 3 1-2 hours.

1. The ventilating current of a certain district is charged with marsh gas, CH_4, to the amount of 3 %; the ventilating pressure is $2\frac{1}{2}$ inches W. G. What would be the percentage of gas if the speed of the fan should be reduced to show a W. G. of 1 inch?

2. If 10,000 cubic feet of air per minute passes through an airway 7 feet by 8 feet, what volume of air will pass through an airway 5 feet by 6 feet, length of airway and power remaining the same?

3. It is required to pass 25,000 feet of air through two airways of equal area, one being 900 feet and the other 1,600 feet in length. What quantity would pass through each, both being separate splits from one intake?

4. If, with a given power, 112,000 cubic feet of air per minute passes through a mine with a pressure of $1\frac{3}{4}$ inches W. G., what would be the quantity and pressure if the power should be increased 3 times?

5. If, with a W. G. of 1.3 inches, 120,000 cubic feet of air is obtained with a given power, what would the quantity be if the resistance should be doubled, the power remaining the same?

6. How may a large body of carbonic acid gas when lying in a depressed position of a main return act as a stoppage of the ventilating current?

7. If the depths of the shaft of a mine ventilated by a furnace be 900 feet, the temperature of the downcast 39° and the upcast 140°, and the height of the barometer 30 inches, what will the ventilating pressure be in pounds per square foot?

8. Does a high velocity in the air current of a mine always ensure good ventilation?

9. What is natural ventilation? Upon what does it depend? Is it reliable? If not, why not?

10. In what part of the mine should observations with the anemometer be taken, and why?

11. How would you distribute the air to give the best results as to the safety of the employees in a mine generating large quantities of explosive gases?

12. If an explosion should take place destroying the mechanical ventilation, how would you proceed to restore the ventilation to rescue those in the mine?

Machinery. Time, 3 hours.

1. Why does water rise to a pump when the piston is in operation, or in other words, why does a pump lift water?

2. In a shaft 600 feet deep there is a column of cast iron pipes 12 inches in diameter connected to an underground pump; what is the total weight of water contained in the pipes? What is the pressure per square inch upon the lowest pipe, and what should be the thickness of the pipe for this pressure, allowing a safe working strain on cast iron of 2,000 pounds per square inch?

3. Of the two modes of operating safety catches on mine cages, one by weights and the other by springs, state which mode you would prefer, and give reasons for same?

4. What H. P. engine will be required to haul 800 tons of coal in 10 hours up an incline 1,000 yards long, having a raise of 1 in 15: engine hauling $\frac{1}{3}$ time allow 60 per cent. for efficiency of engine?

5. In a coal mine, the slope of which is 2,700 feet in length pitching at a grade of 1 in 6, the quantity of water accumulating in 24 hours is 250,000 American gallons: give size of steam and water cylinders of a direct acting duplex pump to remove this quantity by pumping 8 hours per day, allowing an effective steam pressure at pump of 50 pounds per square inch?

6. What is the H. P. of a steam engine which is capable of hauling a train of 12 cars of coal, by a single rope, up an incline 600 yards long with a dip of 1 in 4, in 4 minutes? The cars weigh 560 pounds and carry 1,344 pounds of coal, allowance to be made for weight of rope and 1-50 total load for friction?

7. If a pair of engines geared 3 to 1, with a drum of 5 feet diameter, are employed to do the work mentioned in the last question, what will be the diameter of the cylinders and length of stroke, the effective steam pressure on the piston being 40 pounds per square inch?

8. Find the total horse-power of a single cylinder engine 10 inches in diameter, 16-inch stroke, making 150 revolutions per minute, with effective steam pressure on the piston of 50 pounds per square inch?

9. Find diameter and length of stroke of cylinders for a pair of direct coupled winding engines to raise 500 tons of coal in 8 hours from a depth of 720 feet; give size of rope, weight of cages, cars, and weight of coal lifted each winding?

THIBERT CREEK.

THIBERT CREEK MINING Co.'s PITS.

10. Give size of a round crucible steel wire rope for a safe working load of 3.6 tons?

11. Give size of a water cylinder of a pump to deliver in 8 hours the same quantity as one of 5 inches diameter is pumping in 24 hours? Give diameter of steam cylinder for a direct acting steam pump for this size of water cylinder for a lift of 400 feet vertical, and effective steam pressure on piston of 30 pounds per square inch?

Surveying. Time, 3 1-2 hours.

1. What is meant by true and magnetic meridians? How do you find the true meridian?

2. Plot the following course and distances to a scale of one (1) chain to one (1) inch, and give the area in acres, roods and perches:—

N. 27° 30′ E. 3.05 chains.
S. 86° 15′ E. 2.25 "
S. 26° 15′ E. 3.63 "
S. 15° 30′ W. 3.17 "
S. 71° 30′ W. 1.84 "
N. 13° 45′ W. 4.45 "
West 1.64 "

3. Ascertain by computation the closing course and distance to the following field-notes:—

A. to B. N. 20° 00′ E. 204 feet.
B. to C. N. 40 05′ W. 155 "
C. to D. S. 70° 33′ E. 262 "
D. to E. S. 11° 55′ E. 278 "
E. to F. S. 43 30′ E. 290 "
F. to G. N. 64 10′ W. 230 "
G. to H. S. 53 00′ W. 279 "
H. to A., the course and distance required.

4. Explain how you would level the levelling instrument?

5. Make out the form of field book you would use for levelling, and fill in the following sights:—

Station, Ft.	Back Sight.	Fore Sight.
100	6.25	4.30
200	7.24	6.42
300	4.42	5.31
400	8.21	6.42
500	10.21	3.20
600	0.10	10.78

6. Plot a profile from the above notes, horizontal scale, 50 feet to one (1) inch; vertical scale, 5 feet to one (1) inch.

7. A level is driven N. 43° E., and the stalls N. 17° W.; width of stalls 27 feet and width of pillars 33 feet; what is the distance, on the level, from centre to centre of stalls?

8. Explain the use of the vernier as applied to surveying instruments?

9. Find the length of a circular arc of 51° 30′, the radius being 23 feet?

General Work. Time, 3 hours.

1. What are the uses of the following instruments in connection with coal mines: Anemometer, thermometer, barometer and water gauge?

2. What are the principles involved in obtaining the constant number 5.2 in connection with the water gauge?

3. In the timbering of the airways of a certain mine round timber 8 inches in diameter is used for caps for a width of 8 feet between posts; what should be the diameter of the caps in an airway 14 feet wide between posts in the same mine?

4. Give the comparative advantages and disadvantages of the long wall and pillar and stall method of working a coal mine?

5. With gas burning inside the gauze of a safety lamp, explain the reason why the flame will not pass through the gauze with ordinary care?

6. What principle would guide you in the construction of overcasts for the ventilation of a coal mine to secure safety and economy?

7. How would you ascertain if a safety lamp is in proper and safe condition for use?

8. Explain how you would proceed to find the specific gravity of a piece of coal?

9. A rectangular shaped coal field, one mile long and one-half mile wide, contains three workable seams of coal; the first seam is 3 feet thick, specific gravity, 1.28; second seam, 2 feet 9 inches thick, specific gravity, 1.29; third seam, 2 feet 6 inches thick, specific gravity, 1.3; compute the available amount of coal in this field, allowing 20 % for loss?

10. State what precautions you would adopt in entering a mine after an explosion of a large body of fire damp?

11. To prospect a new coal field three bore holes, Nos. 1, 2 and 3, have been put down to a seam of coal; the depths to the bottom of the seam are, for No. 1, 680 feet; No. 2, 581 feet; No. 3, 603 feet; the horizontal distances are from No. 1 to No. 2, 609 feet; No. 1 to No. 3 495 feet; the bearing of No. 2 hole from No. 1 is N. 19° E.; the bearing of No. 3 hole from No. 1 is N. 58° W.; the surface is level; find the bearing of line of strike and line of dip; also the amount of dip?

12. Show upon the accompanying plan how you would ventilate the mine; also what arrangements you would make for haulage?

13. What would you consider a good grade for a haulage road or main level to bottom of shaft?

14. What particular dangers are there in pillar drawing in a mine giving off explosive gas?

The following is a list of those holding certificates of competency under the Act:—

REGISTERED LIST OF COLLIERY MANAGERS' SERVICE CERTIFICATES ISSUED UNDER SECTION 26, "COAL MINES REGULATION ACT, 1897."

John Bryden, Ex-M.P.P., Victoria.
*James Gillispie.
Edward G. Prior, Minister of Mines, Victoria.
Thomas A. Buckley.
*John Dick.
Archibald Dick, Government Inspector of Mines.
James Dunsmuir, Victoria, Premier of Province.
James Cairns, Comox, farmer.

"Coal Mines Regulation Act, 1877," Registered List of Certificates of Competency.

Name.	Address.	Date.	
Shepherd, Francis H	Nanaimo	5th March,	1881.
Gibson, Richard	"	"	"
*McGregor, William		"	"
Honobin, William	not known	1st May,	1882.
*Muir, Archibald		"	"
Little, Francis D.	Union	"	"
Martell, Joshua	Nanaimo	"	"
*Scott, Robert		"	"
Chandler, William	not known	21st December,	1883.
Priest, Elijah	Extension	"	"
McGregor, James	Nanaimo	18th January,	1888.
Randle, Joseph		"	"
*Dickinson, Urick Evan		8th January,	1889.
Matthews, John	Union	"	"
*Jones, John Bunyan Louis		"	"
Norton, Richard Henry		26th August,	"
Bryden, Andrew	Extension	30th December,	"
Russell, Thomas	Nanaimo	20th April,	1891.
Sharp, Alexander	not known	27th October,	"
*Lindsay, William Alfred		4th March,	1892.
Kesley, John	Union	"	"
Wall, William H	Nanaimo	30th May,	1896.
Morgan, Thomas	"	"	"
Wilson, David	Extension	"	"
Smith, Frank B	Crow's Nest, Fernie	"	"
*Jamieson, Robert		"	"
Bradshaw, George B.	Nanaimo	12th June,	1899.
Simpson, William G	Extension	"	"
*Fisher, Robert		5th November,	"
Hargreaves, James	Crow's Nest, Fernie	5th February,	1901.
Drinnan, Robert G	Nanaimo	"	"
Browitt, Benjamin	"	3rd August,	"
Stockett, Thomas, Jr	Fernie	"	"
Pearson, Robert	"	"	"
Cunliffe, John	Extension	"	"
Lamb, Robert B	Fernie	"	"
Evans, Daniel	Michel	"	"

*Dead.

COAL MINES REGULATION ACT AMENDMENT ACT, 1901.

Under the above Act it has been made imperative that every coal miner, fire boss, overman and shotlighter employed in British Columbia coal mines must possess certificates of competency as such. Under section 112 of said Act, the regulations issued by the Lieutenant-Governor in Council for the carrying out of its provisions shall be deemed part of such Act.

The following regulations have been issued, under date of 9th January, 1902, and are herewith published for information of those concerned:—

Regulations Under the "Coal Mines Regulation Act Amendment Act, 1901."

Constitution of Board.

1. Each member of the Board of Examiners shall be entitled to vote at every examination.

2. Each Board shall, within ten days of its formation, meet and elect from its members a Chairman, who shall preside at all examinations and meetings of the Board.

3. The person appointed by the Lieutenant-Governor in Council to serve on each Board shall act as Secretary thereto, and keep minutes of all proceedings, record of all candidates for

and result of examinations, issue certificates of competency, and forward the prescribed returns to the Department of Mines. He shall also attend to all correspondence of the Board, and answer all enquiries made to him regarding the affairs thereof.

4. The owner or manager of each mine shall, on or before the first day of December in each year, forward to the Department of Mines, upon the prescribed form, notice of the two persons nominated by him to act on such Board. He may also nominate two other persons as alternates to act in the absence of the members nominated by him. In the event of such nomination not being made the Minister of Mines may appoint two members to act on behalf of the owners of the mine.

5. At each election for coal miner members of a Board there shall be two alternates appointed who shall be the two candidates receiving the next highest number of votes to those elected. Such alternates shall act upon such Board in the absence of the elected members.

6. In the event of any one or more of such elected or alternate coal miners ceasing to be employed in the mine for which he or they were elected or appointed, he or they shall, ipso facto, cease to be members or alternates as the case may be.

7. As soon as possible after a Board has been constituted there shall be published in the British Columbia Gazette, and in a newspaper circulating in the vicinity of the mine, a notice giving the names of the persons constituting such Board and the alternates. The name of the post office address of the Secretary shall also be contained in such notice, together with an intimation that all persons requiring information as to the conduct of examinations shall apply to the Secretary of the nearest Board.

8. The members of the Boards first constituted shall enter upon their duties on the first day of March, 1902; thereafter each Board shall enter upon its duties on the first day of January. All Boards shall continue in office until the first day of January next ensuing, or until successors are appointed or elected.

9. A Board of Examiners may be formed, by permission of the Minister of Mines, at any mine where its constitution may be rendered necessary after the regular date of formation in any year, but if such Board be constituted after the 1st September such Board shall hold office until the 31st December next ensuing and for one year thereafter.

10. If, from any cause, a full Board cannot be constituted at any mine from the regularly elected and appointed members and alternates the vacancies may be filled by the Minister of Mines.

Elections.

11. The first election of coal miners as members of the Boards of Examiners shall take place on the 15th day of February, 1902; thereafter such elections shall take place on the second Saturday in December in each year.

12. One week before the date set for each election the owner or manager of every mine, at which a Board of Examiners has been constituted, shall forward a list, certified by him to be a correct one, of the coal miners actually working in the mine. Only the persons named on such list shall be entitled to vote at the ensuing election.

13. All candidates at such election shall be nominated in writing by at least two coal miners working in the mine, and such nomination, together with the candidates' acceptance thereof, in the prescribed form, shall be delivered to the Secretary at least seven days before the election. No coal miner whose name does not appear on the list furnished by the owner or manager shall be eligible for election to the Board. At least four days before the election the Secretary shall post notices of such election, together with the names of the candidates thereat, in at least three conspicuous places about the mine.

14. All elections shall be by ballot, and the Secretary to the Board of Examiners shall act as returning officer.

15. When any coal miner shall apply for a ballot the Secretary shall satisfy himself that the name of such person is on the list furnished to him. At any election after the first the Secretary may require any applicant for a ballot to produce his Certificate of Competency, and if such certificate be not produced no ballot shall be furnished to the applicant.

16. The election shall be held between the hours of two and six o'clock in the afternoon, at such place as shall be designated by the Secretary, and shall be conducted in the following manner :—

(*a*.) The Secretary, after satisfying himself that the applicant is entitled to vote, shall furnish him with a ballot on which shall be written or printed, in alphabetical order, the names of the candidates. The Secretary shall place his initials on the back of each ballot before handing it to the voter, and the voter, after marking same, shall fold it in such a manner that such initials shall be visible, and show the same to the Secretary before placing it in the ballot box :

(*b*.) The ballot box shall be sealed during the continuance of the election :

(*c*.) Each voter shall be entitled to vote for two candidates and no more, and shall vote by marking a cross opposite the names of the candidates for whom he votes. Any ballot marked for more than two candidates shall be void :

(*d*.) At the conclusion of the election the Secretary shall open the ballot box and proceed to count the votes. The two candidates receiving the highest number of votes shall be declared elected, and the two receiving the next highest number of votes shall be declared alternates. In the case of any tie the Secretary shall have a casting vote :

(*e*.) Any candidate, or one person acting on his behalf, may be present at the counting of votes :

(*f*.) The Secretary shall forward the marked ballots to the Department of Mines, together with his certificate of the result of the election within three days after the same. Such ballots shall be destroyed at the end of thirty days if no dispute arises as to such election. If a dispute arises they shall be destroyed forthwith after its settlement :

(*g*.) In the event of any dispute arising as to the result or conduct of any election, the matter shall be referred to the Minister of Mines, whose decision shall be final. He may order a new election or otherwise deal with the case as he may deem fit.

Examinations.

17. Notice of the date and place of each examination shall be posted for at least seven days before the holding of the same, at three or more conspicuous places about the mine. All candidates for examination shall give at least two days' notice to the Secretary and pay to him the following examination fees :— For examination as overmen, five dollars ; for examination as fire-bosses and shot-lighters, two dollars and a half, and for examination as coal miners, one dollar.

18. The examination shall commence on the day named and continue until all the applicants have been examined.

19. The result of each examination shall be certified under the hand of at least three examiners, in a book to be kept by the Secretary for that purpose, and a report thereof, in the prescribed form, shall be forwarded to the Department of Mines within ten days after the conclusion of each examination.

20. All certificates or testimonials presented by persons coming before the Board must be clear and satisfactory, and in case of doubt the Board may require additional confirmation or proof of the same.

21. Candidates shall produce their previous certificates of employment when presenting themselves for examination.

22. The Board, in the case of candidates for certificates as shot-lighters, fire-bosses or overmen, will see that they have certificates of competency as coal miners, or show at the time of their examination that they can pass such examination of competency, and will be careful to see that they are qualified as to their practical knowledge of gas and the duties of shot-lighters and gas examiners.

23. All fees paid in respect of examinations and certificates of competency under this Act shall be forwarded by the Secretary to the Treasury at the end of each month, and shall form part of the Consolidated Revenue of the Province of British Columbia.

24. Examinations for certificates of competency as coal miners shall be *viva voce*, but those for shot-lighters, fire-bosses and overmen may be *viva voce* or written, or partly written and partly oral in the discretion of the Board of Examiners.

Certificates of Competency.

25. All members of any Board of Examiners and alternates appointed or elected to hold office during the year 1902, shall be entitled, without examination, to receive certificates of competency of the class in which, at the time of such appointment or election, they shall be employed.

26. All holders of certificates of competency or service as coal mine managers shall be entitled, without examination, to certificates of competency as overmen on application to the Secrerary to the nearest Board of Examiners and production of their certificates.

27. A certificate of competency as shot-lighter, fire-boss or overman shall carry with it all the rights and privileges granted to a coal miner by a certificate of competency as such, and the holder thereof shall be eligible for nomination and election as a coal miner member of any Board of Examiners or alternate, and to vote at any such election.

28. In the case of any person who claims to have lost his certificate of competency, he shall apply to the Secretary to the Board from which he received the same for a substituted certificate. The said Secretary, upon proof satisfactory to him of such loss, may issue such substituted certificate, endorsing upon the face thereof the words "Issued as a substituted certificate for No. , satisfactory proof of the loss of same having been given." Should any person not be able to secure such substituted certificate he shall be treated only as a new applicant and be subjected to examination. In the event of the Board of Examiners from which such lost certificate was obtained, having ceased to exist, a substituted certificate may be obtained from the Department of Mines upon satisfactory proof of loss being given.

29. The charge for a substituted certificate of competency shall be fifty cents.

30. A certificate of competency may be cancelled or suspended for any length of time by the Minister of Mines should the holder thereof be convicted of any offence under any Act relating to coal mining. A person whose certificate of competency has been cancelled shall only be permitted to apply for a new one with the permission of the Minister of Mines.

31. A person may be employed as an overman, fire-boss, shot-lighter or coal miner in any mine between the date of one examination and another, but he shall be forthwith discharged if a certificate of competency is not granted to him at the next examination.

CARIBOO DISTRICT.

CARIBOO AND QUESNEL MINING DIVISIONS.

Report by John Bowron, Gold Commissioner.

I have the honour to submit my twenty-seventh annual report on the mining operations in Cariboo district during the year 1901.

The past season has been somewhat unfavourable for the mining industry of Cariboo as regards the production of gold, for although there was an abundance of water during the first part of the summer, about the end of July last a dry spell set in which compelled nearly all the hydraulic claims to suspend operations.

The celebrated Consolidated Cariboo Hydraulic Mining Company, by far the most prolific gold-producer of the district, was compelled to cease operations after an exceedingly short run, the result being an immense shortage in its output for the season; but the other mines of the district, notwithstanding the scarcity of water, did very well; in fact, they exceeded their output of last year.

Although some few companies, which had gone to considerable expense in installing plants on their properties, have not felt themselves warranted, from the prospects obtained, in proceeding further under existing conditions, yet quite a number have proved their ground valuable and are installing additional plants in order to carry on work in a more systematic manner than heretofore. The depressing influence exerted on the London money market by the continuance of the South African war, together with the labour troubles of the United States, have retarded the progress of this district as well as that of other parts of the Province, in the one case by holding back English capital, and in the other by preventing the expeditious construction of hydraulic mining machinery, in consequence of which several of the leading companies were unable to put their mines in operation.

However, much material progress has been made in the development of our mineral resources. The successful working of the new machinery of the Cariboo Gold Fields will assuredly make this a most valuable property, and the satisfactory results obtained from the working of the 8-Mile lake mine, of the Thistle Company, proves beyond doubt that this will be a dividend-paying proposition in the future, while the same may be said of the Cariboo Exploration Company's mine at Burns creek. The satisfactory showing, too, made by Mr. Lasell, on China creek near Wolf creek, and the very tangible proof that the deep ground on Stewart creek, worked by Messrs. Pettry & Co., adds another stream to the already large number of gold producers, all seems to prove that, even in the neighbourhood of Barkerville, where so much prospecting has been done, there yet remains much virgin ground worthy the attention of the prospector.

Besides the present producing mines there are a large number of enterprises in a forward state of development, from the indications of which may be drawn a well-founded faith in the future of the placer mines of the District of Cariboo. Of the more prominent of the above may be mentioned the Miocene Co., of Horsefly; the Maud Hydraulic Mining Co., Four-Mile creek; the Montreal and B. C. Prospecting and Promoting Co., and the National Hydraulic Mining Co., both of Quesnel river; Seymour Baker's enterprise, at West creek; the Gold Gravels and Drainage Co., of lower Lightning creek; the Slough Creek, Limited; the Cariboo Gold Field, Limited; Mr. Laird's developments at Willow river; the Premier and White Star propositions, at Peter's creek; the Cariboo Deeps properties, at Nugget gulch, Antler, and Canadian creeks; the Slocan Cariboo Co., at Canadian creek; and the Mount and First of May Companies, of Williams creek, besides many others of lesser note.

Discoveries on Horsefly River.

Of the new discoveries on the upper waters of the Horsefly river, in the southern part of the district, doubtless some information will be expected in this report; but the great difficulty of getting reliable data renders it impossible for me to speak thereof with any degree of certainty. The impresion is prevalent that these discoveries will ultimately prove to be the source from which the deep river channels at Quesnel Forks and at Harper's Camp (Horsefly) have received their supply of auriferous deposit. If such proves to be the case the importance of the above-mentioned discoveries to the Province would be difficult to over estimate.

Mr. R. N. Campbell, one of the discoverers, writes me as follows:—"About the 1st of October last, in company with J. Stirsky, A. Sims, J. Craddock and Fred. Tasse, I made a trip to near the headwaters of the south forks of the Horsefly river, and after five days' prospecting found gold in paying quantities on the creek now known as "Eureka." This creek is about seventy miles from Harper's camp and about ten miles from where Barrett & Co. were working. The formation on the south fork of Horsefly river resembles the ground in the vicinity of Barkerville, only it contains more float quartz, the blue dirt being identical with that found on Williams creek and highly impregnated with iron. On the main south fork we sunk a shaft through this blue dirt to a depth of 23 feet and gold was panned out from the underlying gravel, but we were driven out by the water, and did not get to bed-rock. I am sorry to see so much excitement over this discovery at present, because we had not time to prospect thoroughly; one thing, however, is certain—good diggings and easy to work will be found during the coming summer. Our ground on Eureka creek will pay at least one ounce a day to the man, and I cannot see why there should not be even better creeks in these mountains. The gold is heavy though not very coarse, $1.25 being the value of the largest piece obtained. Some money is badly needed to open up a trail in the spring, as it is a very hard country to travel through. We shall take our supplies in in February, over the ice and up the lake.

"The altitude is about 4,500 feet, snow remaining on the peaks all the summer; indeed, we were on 20 feet of old snow the day we found gold on Eureka creek. The timber is fir, spruce and balsam, and will make excellent lumber.

"I think there will be a good camp here in the course of a year, although there will be much disappointment among those who attempt to go in during the winter."

Last summer a number of placer mining leases of ground situated on the upper waters of the Horsefly river were issued to sundry persons. These claims are ten or twelve miles below the new discoveries, and were subsequently bonded to Mr. L. S. M. Barrett, who, writing me on September 26th, speaks of his summer's operations as follows:—

"My work this year consisted solely of an examination of the property by means of ground sluices along the river and by pits, from four to eight feet in depth, on the upper benches, as well as by panning the present river bed in places. I also sank a shaft for 27 feet through the blue clay, but failed to reach bedrock. The blue clay showed heavy sulphurets and very little gold, but the rubbly gravel below improved in the few pans we tried. From

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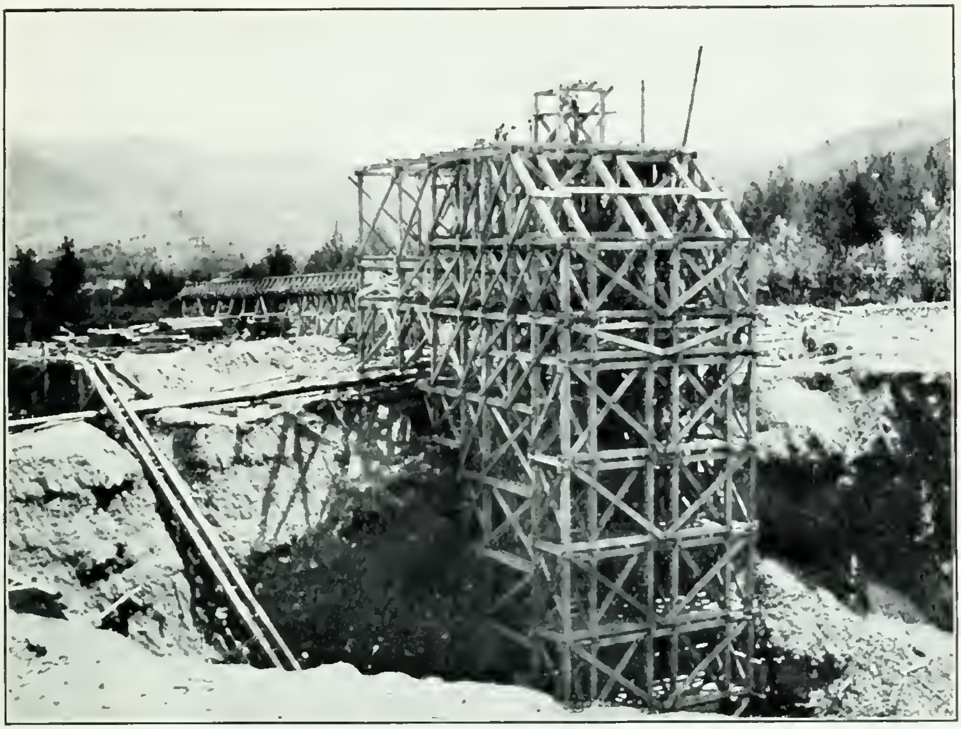
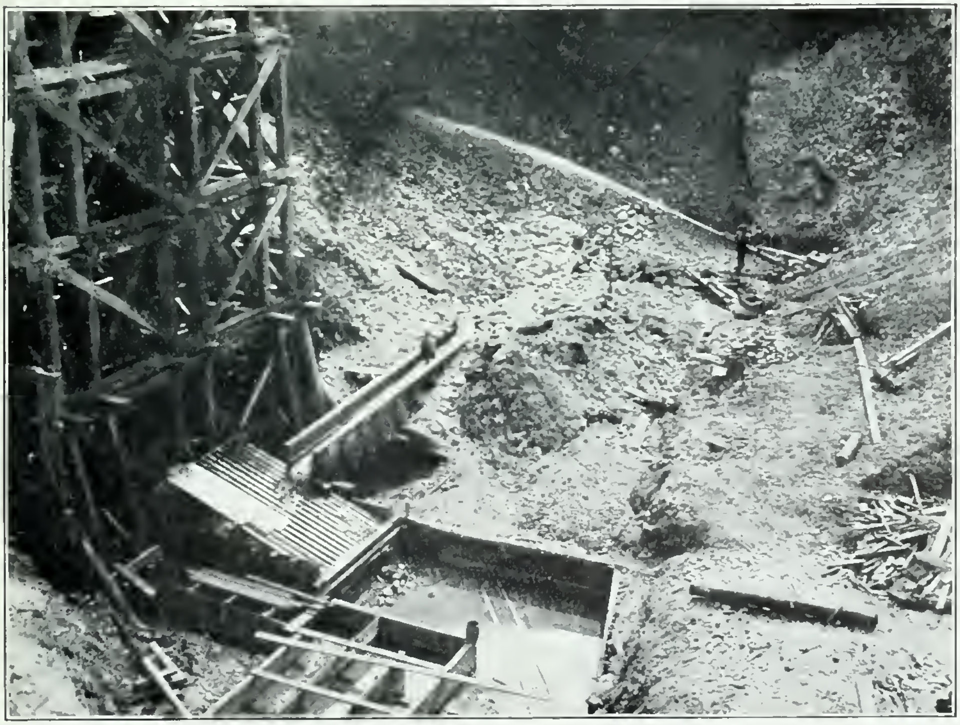
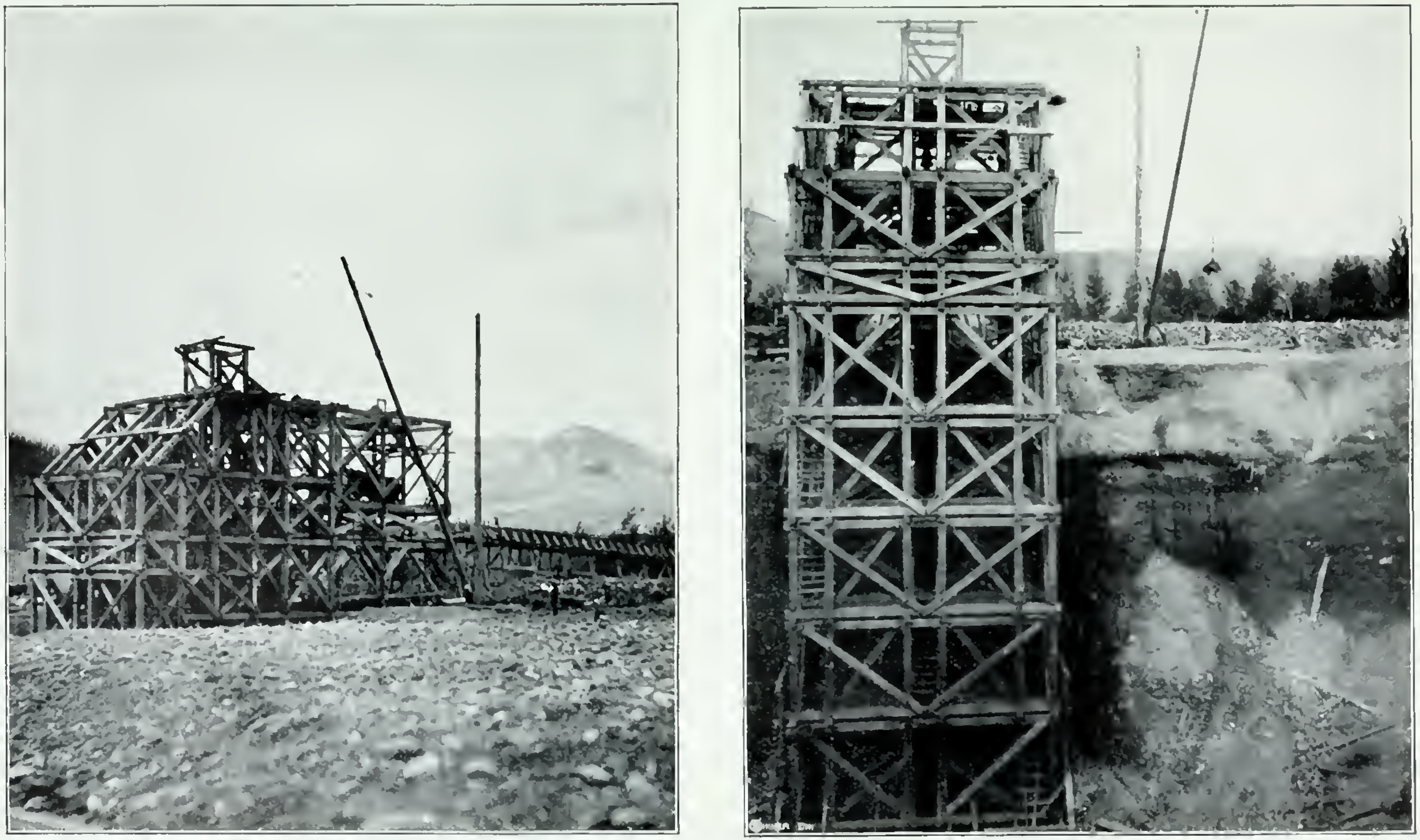
NOTE.—The "miner's inch" in B. C. is defined by law as a flow of 1.68 cubic feet per minute.



UPPER PART C. G. F. BUCKET ELEVATOR.



LOWER PART C. G. F. BUCKET ELEVATOR.



CHAIN BUCKET ELEVATOR—CARIBOO GOLD FIELDS, LTD.—CARIBOO.

the position of rimrock on both sides of the river I should not consider the bedrock over eight feet below us. The formation is chiefly slate and schist, and I am of opinion that the gold is derived from the immediate surroundings. The fall of the river is very rapid, and the banks are steep, rising in places to a height of 180 feet. There is plenty of timber, chiefly white pine, and in some parts cedar, but grass or feed for horses is very scarce.

"During the coming year (1902) I propose to construct a ditch and flume about five miles in length, and to bring in a saw-mill, electric and hydraulic plants, the total cost of which will be about $50,000. In order to convey the plant to the property it will be necessary to cut a road for seven miles, from Harper's camp to Horsefly lake, carry the machinery up the lake for 38 miles by means of a launch and scow, and thence bring it for eight miles, over a pass 600 feet high, to the mine.

"The country has never been prospected before owing to the impossibility of carrying provisions through the heavy timber and the absence of feed for horses, but I have no fear for the result of our operations, as very seldom was a pan taken without two or three, and in many places as many as twenty or thirty colours."

SPANISH AND BLACK BEAR CREEKS.

The surface of these creeks was profitably worked in the early "sixties," and then abandoned. Of late years attempts are being made to prove the value of the deep channels, and one of the companies operating on Spanish creek has, I learn, reached the bottom and is now on good pay.

Concerning the above creeks Mr. James Moore writes me as follows:—"Black Bear creek, where the mines I represent are located, is practically a new section of the Cariboo District, of which at present very little is known. About thirty years ago some desultory prospecting was done on high bedrock, where coarse, heavy gold, apparently deposited in the creek by a slide from the hill, was obtained. Since then nothing was done until about two years ago we began to prospect the deep channel of the creek. We found the depth to be, approximately, 350 feet below the surface instead of 100 feet as we first imagined. Having constructed a substantial dump house 40 x 50 feet and a dwelling house, and having whip-sawed 25,000 feet of lumber, as well as put up machinery for hoisting and pumping, and installed two jack head pumps to handle the water, we began sinking our shaft and got down 100 feet, when we found the rim-rock pitching at an angle of 40 degrees into deeper ground under the hill. We then took levels and found a difference of 350 feet from our dump house on Black Bear creek to the Moore Company's workings on Spanish creek. We then suspended operations in sinking the shaft, and now have decided to open up the mine by running 2,500 feet of drain tunnel to connect with the shaft referred to at a depth of 235 feet. This work we intend to commence this winter or early next spring. The mine can be worked twelve months in the year when drained. The only machinery contemplated now is a small saw-mill, but an electric plant may be installed in the near future."

QUESNEL RIVER.

The Montreal-B. C. P. & P. Company has done nothing further during the present season to prove the value of its extensive holdings.

The Maud Hydraulic Mining Company, of Four Mile creek, although doing nothing to develop its property, has constructed a road from Quesnel Forks to the mine at an expense of $2,000.

NATIONAL HYDRAULIC COMPANY.

The National Hydraulic Company is a new organisation, and its operations this year have been confined to the installing of plant and constructing a ditch and flume. Mr. G. L. Betts, the engineer in charge, writes as follows :—

"I am pleased to give you the following information about the properties owned by the National Hydraulic Mining Company, of Pittsburg, Penn., for which I have been acting as engineer :—

"The Company has four leases of eighty acres each, on the south side of the Quesnel river, below the mouth of the Beaver river, and has acquired 3,000 inches of the water of the latter, which is diverted at a point about 5 miles from where it enters the Quesnel.

"A good deal of time was taken up during the first part of the season in making the necessary surveys, etc., and no actual construction of flumes and ditches was begun until June. The cutting of lumber and building of flumes and ditches were let by contract, and the total line is made up as follows: Flume, 11,350 feet; ditch, 16.500 feet, and a pipe line of 22, 16, 12 and 9-inch pipe, 2,700 feet in length. All will be completed by the end of the season with the exception of about 3,500 feet of fluming, and had it not been for the scarcity of labour, the work would have been finished this year.

"Substantial mess and bunk houses have been erected, and in fact everything will be in readiness next season to begin actual mining."

Mr. W. A. Johnston, of Quesnel (to whom I am indebted for the collection of Mining Statistics in the Quesnel Division of this District), writes me as follows :—

"The number of hydraulic mines in actual operation during the past season has been somewhat limited, but amongst others might be mentioned the West Creek, on the Fraser river, the Scandanavian, on the Quesnel river, and the Cottonwood-Alluvial, on the Cottonwood river, which have all been worked more or less continuously, the two first named by ordinary hydraulic process and the latter by a rather novel method of raising water from the river with a centrifugal pump run by steam power, which is claimed to have worked very successfully, and may in the future simplify the working of low benches along the rivers and large creeks where water is scarce.

"Further up Quesnel river the claims of W. Miller and the Belanger brothers have been worked continuously during the mining season by rocker process. These are situated on a bench some twenty-five feet above the river, and are supposed to be paying very well considering that the water has to be carried from the river for washing the gravel. Mr. Miller has this season introduced a one-horse power pump, which is probably in operation by this time, and which will materially reduce the cost of working the ground.

"The National Hydraulic Company of Pittsburg, the ground of which is situated at the junction of the Quesnel and Beaver rivers, on a high bench, has been carrying on development work on a large scale during the season. The ditch, finished a short time ago, is about five miles long and is intended to carry 2,000 inches of water, the amount of lumber required to build the necessary flume and for buildings, etc., being about 400,000 feet. The management expect to have the mine in operation about the first of July, 1902. The estimated cost of this development work is about $45,000, and considering the natural advantages enjoyed by the Company of an unlimited supply of water, excellent dump, and a large area of ground, this should be one of the permanent producing mines of the District.

"Bar mining is still largely carried on, principally by Chinese on the Fraser and Quesnel rivers, and also on the Cottonwood; on the latter streams considerable work has been done this season in the way of wing-dams in the bed of the stream.

"Dredging operations have been at a standstill, presumably waiting for results from the machines operating on the lower Fraser and Thompson rivers."

THE COTTONWOOD ALLUVIAL GOLD MINING COMPANY.

Mr. J. Seymour Baker refers briefly to his operations in the Quesnel Division of the District. He says:—

"The Cottonwood Alluvial Gold Mining Company having lost its flume by a very serious landslide the previous year, a steam pump was placed on the mine, raising water out of the Fraser river to ground sluice. The pump worked very successfully, but the rock was found to rise so rapidly and to such a height above the river that operations had to be stopped.

"On the West Creek mine (Fraser river) four shafts were sunk to bedrock on the old channel; all were through ground-up granite and boulders with little or no gravel, and this was so hard that it had to be blasted, although evidently deposited by water.

"In two of the shafts no gold was found, but the other two yielded from two to four dollars to the cubic yard. The results are promising and operations will be resumed next year."

Mr. Baker further says that some work has been done on quartz reefs but that the results on those tested were not sufficiently good to justify further operations.

PREMIER AND WHITE STAR COMPANIES OF PETERS CREEK.

Mr. N. F. Murray, acting Manager of the Premier and White Star Companies, operating on Peters creek, writes as follows:—

"On the Premier Company's property we started in 1900 to run a drain tunnel to tap bedrock. A great deal of preliminary work was necessary in the way of houses, roads, surveying, etc., but this was put in shape late in the summer of 1900 and operations were finally begun upon the tunnel, dirt from which has been hoisted up inclines almost from the start. From 200 feet beyond the first incline, near the mouth of the drain, the tunnel has been in swelling clay almost entirely and this has necessitated very heavy timbering, in some places almost solid timbers beside the lagging. Hundreds of posts and sills were broken by the heavy pressure and required to be replaced by heavier setts. To add to the complications the tunnel was for a long distance in the joining or contact of this heavy clay, and a layer of watery slum below, necessitating for fully 250 feet the placing of lagging as flooring under the sills. All is clay from the start up to the present face of the drift, and as it has been necessary to blast, powder smoke has been an additional trouble.

"Up to the present we have run 1,498 feet of tunnel, 44 feet of shaft and 130 feet of incline. We are about 40 feet under the creek, the distance to bedrock being, we think, under 20 feet, and we expect to reach it after tunnelling about 500 feet. This bedrock we expect to strike early in the winter and are prepared with ditches and water for the blast and dirt washing, to prosecute work as soon as it is reached.

"Work on the White Star Company's ground was started in September, 1900, since when it has been carried on in a desultory manner up till the present. In February, 1901, a shaft 5 by 8 feet was started and carried down 30 feet, at which point the water stopped further operations. Machinery was then ordered to carry the shaft down the remaining distance, estimated at about 50 feet, and to prospect the channel. An engine-house was built and plant installed, consisting of a fifteen horse-power boiler, a hoisting engine and a Northey sinking pump, since when no work has been done below ground."

THE SLOUGH CREEK LIMITED (FORMERLY THE INCORPORATED EXPLORATION CO., LTD.)

William Thompson, M.E., F.R.G.S., Managing Director; John Hopp, Manager.

The very complete and costly nature of the plant installed, the importance of the situation (it being regarded as the main artery through which the washings of the richest known creeks have passed), and the effect which the success or failure of the enterprise will exert on the future of the district make this one of, if not the most important proposition at present in course of development in Cariboo.

For a fuller knowledge of the magnitude of this undertaking I would refer you to my previous reports, together with the following information kindly furnished by Mr. Hopp.

"After completing the sinking of the shaft, and after the cage had been installed, we began breaking out for the main tunnel, the distance from the collar of the shaft to the floor of the tunnel being 362 feet 4 inches, with 7 feet 8 inches for sump. When everything was put in order the work was actively commenced of driving the main tunnel, using 8-foot caps and 7-foot posts, timbering and lagging it the entire distance, and making room for a double track. After 866 feet had been driven excavations for the pump chamber were begun at the bottom of the shaft, the floor of the pump chamber being 4 feet 6 inches above the floor of the tunnel. We first drove a tunnel for 10 feet to avoid weakening the main shaft. The pump chamber was then cut out (28 feet long by 23½ feet wide by 8 feet high), and securely close timbered with 14-inch square timbers with two rows of the same size posts through the centre to give additional support to the roof.

"Concrete foundations, according to the plan, were then put in, in readiness for the new pumps. As we had only small pumps to handle the bedrock water every care was taken as we neared the channel not to tap more water than we could handle, by keeping a 9-foot drill driven ahead of our work to give warning if water was encountered, until at 941 feet from the shaft work was discontinued, as softer rock with a little seepage water was found, and it was not deemed advisable to run any risk whatever until the pumps were in place. Mr. William Thompson, Managing Director and Consulting Engineer for the Company, purchased the machinery, consisting of two high-class Worthington pumps, each capable of elevating 500 gallons per minute and washing the gravel elevated from the tunnel, and one pump of the same make capable of raising 100 gallons per minute, from the Union Iron Works, of San Francisco, California.

"The necessary additional boilers for these were bought, delivered and erected some months ago. Unfortunately, however, a strike of the machinists and steel workers took place about this time in the shops of the company mentioned, and delayed the delivery of this machinery from the 8th of May until the latter part of October.

"In the tunnel itself an air lock has been constructed, consisting of two steel air and water tight doors set in steel and cement bulkheads, furnished with all necessary pipes, valves, etc., and supplied by the Vancouver Engineering Works, of Vancouver, B. C. The object of the air lock is for a double purpose, first, in the event of meeting with loose gravel and a heavy flow of water in breaking through the rimrock, to use compressed air to prevent the influx of water while the gravel is being removed and the tunnel extended, and, second, in case of an accident to the machinery, to close the doors and fill the face of the tunnel with compressed air, holding the channel water back until the machinery is ready to start again. Every precaution experience could suggest has been taken to ensure that the opening out of the channel may be successfully accomplished. There remain yet 118 feet of tunnel to be driven to the point where the uprise into the channel will be made, after the pumps are installed. This will require careful work and will be somewhat slower than the first part of the drive, but I do not anticipate any further delay and, barring accidents, we should be in the channel by early spring at the latest. Should the ground prove as rich as it is believed to be, the result will give renewed life to the District, with practically an unlimited field for continuous work throughout the year. We employ 25 men."

THE CARIBOO EXPLORATION COMPANY, LIMITED, OF BURNS CREEK.

John Hopp, Manager.

This being the first season this Company has had its hydraulic plant in operation to any extent it is gratifying to learn that the result has been satisfactory to the shareholders. The manager gives me the following information:—

"In the early spring we shovelled the snow from the ditches and flumes, and began hydraulicing as soon as the season was open and we could get water through the ditches. The monitors were changed from two No. 2 Giants to one No. 6, and the results were very satisfactory. In hydraulicing the heavy wash the opening of the pit was a somewhat slow progress in the beginning; however, we made good headway once the bedrock was reached, and a considerable amount of the latter was exposed. The result of the clean-up was very satisfactory. The season was a short one owing to the light snow-fall and the very dry summer and autumn. Considerable work was done in sinking prospect shafts along the bench, to determine the extent and value of the pay gravel, with very satisfactory results. During the hydraulic season we employed 12 men to operate the mine.

"The Nelson creek plant was not operated this year, as it was thought best to do all the work in one place, and further exploration work will be necessary during the coming season to determine the best course to pursue and the point at which to begin operations."

THE DRAGON CREEK MINING COMPANY.

Gust. Lange, Manager.

Regarding this mine it will be satisfactory to state that it has now become one of the paying properties of the District. Mr. Lange, the Manager, writes as follows:—

"The claims of this Company are consolidated, and all the work is done on the upper or "creek" claim. The bed of the creek is 50 feet deep, with an additional 30 to 40 feet of banks. The ground is worked by hydraulicing.

"The Company has two hydraulic plants, with 175 feet of pressure each, and one-quarter of a mile of 40-inch hydraulic flume, the grade of flume being 4½ inches to 12 feet. Half a mile above the present workings a dam, 150 feet long, 19 feet high, 24 feet foundation and 14 feet wide on top, has been built across the creek. This dam is used only when there is less than 1,000 inches of water in the creek.

"The nature of the ground is such that it requires a derrick, which has a capacity of a ton and a half, and thousands of tons of rocks and boulders are hoisted away every season. The Company employs from 12 to 15 men, with an average working season of six or seven months.

"The amount of ground excavated each season is generally 100 feet wide, from rim to rim, by 150 feet up stream, although, at the present time of writing, I regret to say that, on account of an unusually dry season, the advancement made so far is only 100 feet up stream for the season of 1901."

Coulter Creek.

"In regard to the work under my supervision on Coulter creek, I will briefly say that, for the last ten months, we have run about 500 feet of tunnel. We ran, however, into old diggings and found it impossible to go through them on account of water, stumps and logs, consequently we had to abandon this tunnel and begin another above the old workings, which latter, I expect, will be on bedrock before the spring."

CARIBOO GOLD FIELDS, LIMITED.

M. Bailey, Engineer in charge.

The successful working this fall of the bucket elevator plant, installed on this property during the present season (1901), gives promise of good results in the future. Mr. Bailey speaks as follows:—

"In accordance with the request contained in your letter of September 16th, 1901, I herewith submit to you a brief statement in regard to the new elevating plant constructed by this company during the past season.

"The plant was designed by Wm. Thompson & Co., consulting engineers, London, and the machinery was furnished by the Link Belt Machinery Co., of Chicago, Ill.

"The frame work of elevators, built for three lines of bucket chains, only one of which was installed this season, is a structure consisting of a series of eight stories, having a total height of 113 feet and being 37 feet in width. Over 160,000 feet of lumber were used in the construction of this frame work and over 15,000 pounds of bolts.

"Power to run the elevators is developed from a 24-inch Pelton water-wheel, operating under a head of 456 feet. The chain of buckets has a total length of 246 feet, and is composed of 82 buckets each of 2½ cubic feet capacity.

"The plant was designed to have a capacity of handling 2,000 cubic yards of material per 24 hours, but from results obtained in running same this amount will be largely increased Two giants, having four-inch nozzles, working under pressure of 555 feet and 156 feet respectively, are used for hydraulicing the gravel in thé pit. This gravel runs through steel riffle sluice flumes discharging over a grizzly, which separates all boulders over six inches in size. These boulders are hauled to the surface by an incline hoist. The gravel, after passing through this six-inch grizzly, falls into a large hopper, from which it is dredged by the bucket elevator.

"The water used in hydraulicing, after passing through the hopper flows into a settling tank, which removes the sediment, and it is then wasted through the drain tunnel. The sediment, which collects in the tank, is taken out by a hydraulic lift.

"The buckets elevate the gravel to a vertical height of 112 feet, dumping it upon another grizzly which separates all stones over two inches in size. This large gravel passes into the 'coarse gravel compartment' of the main sluice flume and is carried off to the dump.

"The gravel, after passing through the two-inch grizzly, is run into the revolving screen. This screen, 15 feet long by 60 inches in diameter, has a screening surface of woven wire cloth made of $\frac{5}{16}$-inch wire and having a $\frac{3}{8}$-inch mesh.

"The gravel is thoroughly washed in this screen by means of water jets, under a head of 470 feet, from a perforated pipe. The coarse gravel from this screen runs into the 'coarse compartment' of the main sluice flume, while the fine material passes over a series of gold saving tables laid with expanded iron over canvas and cocoanut matting, and into the 'fine department' of the main sluce flume.

"The water required to run off the gravel, after being elevated, through the main sluice flume, is obtained from the Williams creek ditch through an 18-inch diameter pipe line, 900 feet in length. This pipe line discharges into a receiving tank, in the upper story of the frame work, from which it is distributed to the various flumes, chutes, etc., as required.

"Owing to the lack of water, caused by the unusually dry season, it was only possible to test the plant with a small amount of water for a short run of two weeks. Even under these unfavourable circumstances, however, the new plant proved most successful.

"Having thus solved the problem of raising gravel to a great height economically, both as to the amount of water required and cost of working, the results of next season's work should be most satisfactory to the Company. The average number of men employed was 25."

THE CARIBOO CONSOLIDATED, LIMITED.

The properties of this Company, which have been operated under the supervision of Mr. Melbourne Bailey, M. E., have given satisfactory proof of their future value. Mr. Bailey reports as follows:—

"Three hydraulic mines were operated, viz.: Lowhee, on Lowhee creek; San Juan, on the benches of upper Williams creek; and Ah Quay, on the benches of Lightning creek, below Stanley.

Lowhee Claim.

"This mine is equipped with five and three-quarter miles of ditches which supply water to two pipe lines composed of 15 and 11-inch diameter pipe, operating under a head of about 260 and 170 feet respectively. A double compartment sluice flume, having a total length of 826 feet, has been constructed during the past two seasons, and it is proposed to further extend this flume an additional length of 204 feet in the coming spring.

"The total progress made in opening up the channel of Lowhee creek, from rim to rim, in the past two seasons, has been about 650 feet, 280 feet of which have been removed during the past year. The work of opening this channel is made very slow and expensive by reason of the large boulders encountered and also by the great quantities of headings, tailings and old timbers from previous drifting in early days, which have to be removed. A total of 35,000 cubic yards of material was moved during the past season, and the returns were most encouraging for future success. The length of ground yet to be worked on this claim is about 6,500 feet. The daily average number of men employed, from April 3rd to November 3rd, has been 15.

San Juan Claim.

"The ditch bringing water from Williams creek and McCallums gulch to this mine is three-quarters of a mile in length, and supplies water to a pipe line of 15 and 11-inch diameter pipe, operating under a head of about 110 feet. The length of sluice flume during the past season was 132 feet. This flume has been moved to a new position further up the pit for next year's work, and now has a length of 204 feet. During the past season 40,000 cubic yards of material were moved with good results. The total area of this group of claims is 139 acres and very little of this has been worked.

"The daily average number of men employed from April 1st to October 17th has been eight."

Ah Quay Claim.

"The ditch bringing water from Last Chance creek to this mine is three-quarters of a mile in length, and supplies water to a pipe line of 15 and 11-inch diameter pipe, operating under a head of 130 feet. The length of sluice flume is 424 feet. The work done during the past season was principally of a prospecting nature, to determine the depth and values of gravel and the extent of same. A total of about 9,000 cubic yards of material was moved. The total area of this claim is 160 acres. The daily average number of men employed from April 15th to July 8th has been six.

"Plans and estimates have been prepared for the development of other properties held by this Company, and active work is shortly to be expected."

CHINA CREEK (TRIBUTARY OF ANTLER CREEK) LEASE.

This property, of which Mr. B. Lasell is Manager, is a new undertaking of much promise, but insufficient development work has as yet been done to definitely prove its value. Mr. Lasell furnished me with the following information regarding the season's operations:—

"This property consists of two half-mile leases, commencing near the junction of Wolf and Antler creeks, and thence extending southerly and parallel to Antler creek towards Sawmill flat.

"Owing to the fact that this property was not acquired until April, it was considered inadvisable to commence active work until the snow was fairly well off the ground, as a considerable amount of preparatory work was necessary before actual hydraulicing could commence. Water was turned into the pipe on June 18th, and piping was carried on for 50 days. This work exposed a bank of gravel 100 feet wide and 75 feet in height. As the right hand rim has not been struck, it is impossible to state just how much wider the channel will be found to be.

"This is without doubt an ancient high channel of Antler creek, which will prove very extensive. The facilities for working this claim are all that could be wished, both as regards water and a clear dump of 100 feet into the Antler creek valley.

"The water supply is taken from Antler creek, and affords one of the best water privileges in this section of the District, being ample for the full season. After the clean-up (which was a satisfactory one) had been made, the main ditch was cleaned out and repaired, and a new ditch, one-half mile in length, built to supply the new pipe line which will be laid this fall, the penstock and waste flumes having already been built.

"The plant will consist of 20, 18 and 16-inch pipe with a No. 4 Monitor, using a 5-inch nozzle under a 240-foot head. The sluice flume, which is 270 feet long, is laid on a grade of 8 inches to 12 feet.

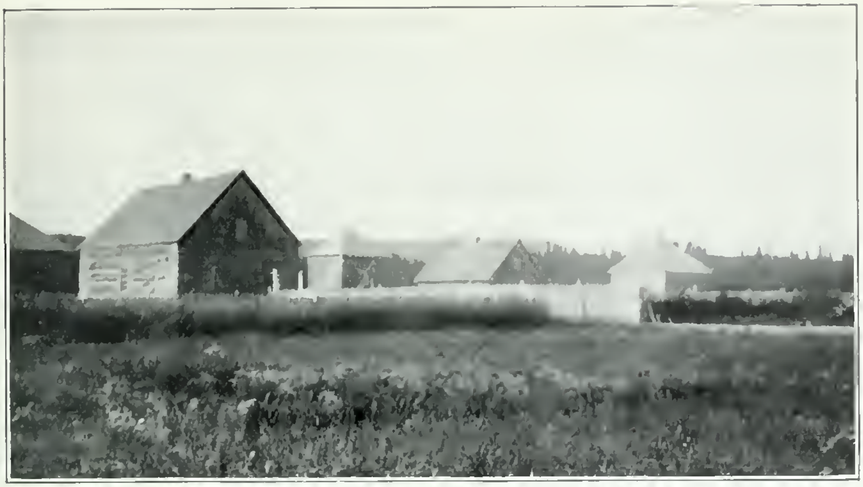
"A substantial camp has been erected, and a waggon road, starting from the main Antler creek road and running up to the claim, was built, thereby affording easy access to the property. The average daily capacity for next season, with both plants in operation, will be not less than 2,000 cubic yards per diem."

THE THISTLE COMPANY OF 8-MILE LAKE.

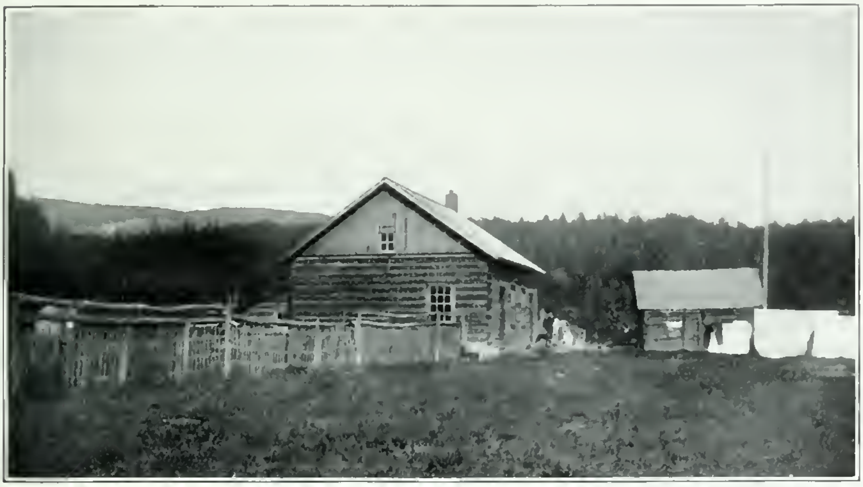
This property was formerly known as the Sutherland Hydraulic Mining Co., Ltd., and from the shewing made this summer I predict that in coming years it will be no inconsiderable contributor to the output of the District. Mr. Peter Sutherland reports briefly as follows:—

"At your request I herewith give result of the current season's clean-up in gold from the Thistle Gold Company's property, 8-Mile lake. We commenced work on May 15th and shut down on October 29th. During the whole month of August we were compelled to suspend work and discharge our men, owing to an almost total shortage of water, the Coffee Creek Mining Co. using one-half our water supply. The Thistle Co. has now purchased the Coffee Creek Co.'s mining interests, thus gaining control of property and water rights and insuring the 8-Mile lake property an abundance of water for the future, which will to a certainty double the present output.

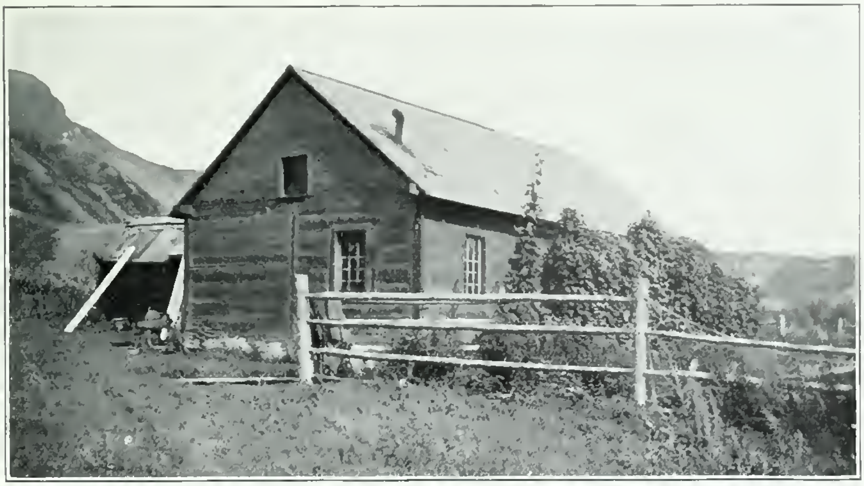
"The product of the present season at 8-Mile lake will exceed $12,000, with a force of only six men on the pay roll."



H. B. Co.'s POST, FORT ST. JAMES, STUART LAKE.



H. B. Co.'s POST, FORT McLEOD, McLEOD LAKE.



H. B. Co.'s POST, FORT ST. JOHN, PEACE RIVER.

THE SLOCAN-CARIBOO MINING AND DEVELOPMENT COMPANY.

H. T. Windt, Manager.

A Toronto syndicate, having purchased the Clear Grit Real Estate property and some other adjoining mining claims, has this year installed a hydraulic plant, and judging from the season's operations, fairly satisfactory results may be expected when the property is opened up. Mr. Windt has favoured me with the following information:

"The Slocan-Cariboo Mining and Development Company, Limited, has five claims on Canadian creek (two of which, known as the Clear Grit and the Miller claims, are Crown-granted) and three half-mile leases. Having tested the former two claims it was decided to work them by hydraulicing, to accomplish which it was necessary to open them up by cutting through the bedrock on the lower lease for about three hundred feet in length with an average width of six feet, the greatest depth being sixteen feet. Work on this cut was started last season, and had been advanced sufficiently by the latter end of June, 1901, to enable us to start piping into the west bank (under which an ancient channel is supposed to exist), in a direct line with the old workings in the Clear Grit claim. Considering the lateness of the season when the water was turned on, there has been a large area uncovered, from which some fine gold was recovered in sufficient quantity to give good hope for next season. There are two dams in use on the property; the upper one, over 120 feet in length, serves as a reservoir, covering an area over three acres in extent. The lower dam is used for sluicing or flushing only, and about 150 rods of ditch conveys the water from the upper dam to the penstock, giving about 125 feet pressure or head. The portion of ground opened up shows a very heavy wash. The boulders are rather large, and are covered first with cemented gravel and clay for about twenty feet, and then with loose dirt which pipes off readily. An average of ten men has been employed during the season.

"There is a vast area ahead which has been prospected through the Miller shaft, and very encouraging results have been obtained at a depth of about 83 feet from the surface."

THE GARIBALDI COMPANY OF HARDSCRABBLE CREEK.

Speaking of this mine, which was referred to in last year's report, I am unable to add anything to the following information, which is supplied by Mr. Johnston:—

"This placer claim, known as the Garibaldi of Hardscrabble creek, has been worked almost continuously during the year. In the early part of the season we completed a drain tunnel about 2,000 feet in length, which had been in course of construction for nearly four years; we then sunk a shaft to connect with the head of the drain, built a shaft house and put in a water-wheel with the necessary hoisting machinery, also a ditch to convey water from the creek to the wheel.

"Since the completion of this development work, the ground has been worked by drifting process at a depth of about 60 feet, with varying results.

"Our experience since drifting was commenced, and in the ground worked further up the creek from shafts, leads us to the conclusion that there is a split in the pay channel and that the principal or heaviest run of gravel lies further to the west; it is our intention, therefore, during the present winter to run a prospecting drive a short distance in that direction to determine this point, and also to determine the quantity of unworked ground on the claim. It is estimated that it will take from two to four years to work out the ground, depending on the development in the drive above referred to."

THE THOMPSON, MCGREGOR AND ROSS MINE, CUNNINGHAM CREEK.

This is a property regarded with much favour by those best able to judge of its value. Mr. Thompson writes me as follows:—

"On the Thompson, McGregor and Ross properties, the first two years were devoted to prospecting and the sinking of shafts and driving of drifts in the basin at the head of the canyon. Having satisfied ourselves of the value and extent of the deposit, we proceeded to development. This work necessitated the removal of jams and obstructions below the canyon, the straightening of the creek, and the confining of the water in one channel. This has been accomplished, substantial rock walls and bulkheads erected, and six feet of additional grade obtained.

"The water of the creek has been taken up at the foot of the basin in a four-foot flume, 700 feet in length, and carried through the canyon and discharged into a ditch leading to the creek 1,500 feet below. Boulders have been blasted and removed from the canyon and the bedrock laid bare.

"An eight-foot bedrock flume, 1,000 feet long, is now being driven through the canyon into the basin; a six and an eight-foot ditch, also in course of construction, will carry the surplus water round the works and discharge it into the bedrock flume at the head of the canyon. Upon the completion of the bedrock flume and ditches a hydraulic plant will be placed in position."

THE PROVINCE MINE, STEWART CREEK.

Of this mine, owned by Messrs. Isaac, Johnston, and Cockell, Mr. Isaac writes as follows:—

"The Province mine is deep or 'drifting' diggings. At present four men are at work putting up a dump house (dimensions, 35 x 20 x 18 feet), and a wheel 12 feet in diameter with 3-foot breast. We intend to work two shifts and shall be able to employ from 15 to 20 men when we get everything fitted up. The mine consists of a lease of one mile of ground and 400 feet held by record. The ground averages 2½ to 3 ounces to the set of ten feet. The mine can be worked all the year round."

THE STEWART CREEK MINING CO., STEWART CREEK.

This property is owned by Messrs. Pettry, Smith, and Moore. Mr. Pettry writes me regarding the mine as follows:

"We first sunk a shaft 40 feet deep to bedrock, getting very favourable prospects but finding so much water as to stop the work; we then ran 1,125 feet of a drain tunnel, and have this year built a water-wheel and hoisting gear, and are working the mine as a drifting claim with a force of five men. Work can be prosecuted all the year round.

"We have about 200 feet of the claim worked out with good results."

Williams Creek.

On Williams creek, the First of May Company, referred to in last year's report, has continued to prosecute development work. Mr. A. McPherson, the foreman, informs me that a blind channel has been discovered from which some 3,000 yards of gravel have been removed during the summer. This channel is about forty feet wide with perpendicular walls 30 feet in height. Mr. McPherson remarks that should the channel continue in its present direction and the gravel prove as rich as that already worked the mine will be a paying proposition for the next ten years.

The Mount Company has done but little during the season to further develop its mine, having been engaged in the construction of a ditch to bring in water from Stouts gulch.

The Waverley Hydraulic Company, of Grouse creek, has, as usual, steadily continued operations and is now near the upper end of the ground which was originally worked by drifting. After reaching this point better results may be looked for. The claim has paid current expenses for the season.

On this creek Messrs. Baker and Deacon's hydraulic mine did fairly well, producing about 160 ounces with the aid of but a scant supply of water.

Apart from the foregoing properties, of which information has been supplied by the various managements, there are a number of prominent mines throughout the district of which I have been unable to obtain any very definite information, but whose importance entitles them to a place in this report.

First of these I would name the Consolidated Cariboo Hydraulic Mine, of Quesnel Forks. This mine, as has been previously mentioned, had but a short run, which alone is sufficient to account for the decrease in the season's output of gold for the district.

The Miocene Company, of Horsefly, has done but little during the season to further exploit its deep ground, owing to its inability to get placed the powerful machinery that has been found necessary.

The Ward claim, in the same locality, has, I am given to understand, had a fairly prosperous season.

The Gold Gravels and Drainage Co., of Lightning creek, having broken through into the channel, found the influx of water too great for the capacity of its pumps, and was compelled to suspend operations for the time.

The Laird Company, of Willow river, after another attempt to break into the channel, was again driven out by water; but, in striking gravel in the channel, for the second time, obtaned excellent prospects of coarse gold. Of the intentions of this Company I am uninformed, but, judging from the energy hitherto displayed, as well as from the positive proof obtained of the value of the ground, there can be but little doubt that work will be resumed at an early day.

The Flynn Bros. & Co. claims, Mosquito creek, and the Butts claims, on Stouts gulch, have as heretofore been among the best paying properties in this part of the district.

The following information regarding properties in which they are interested has been received from Messrs. Veith & Borland, of Keithley creek:—

Snow Shoe Creek.

"After 60 days' piping on the Hayward Hydraulic Mine, the water gave out, but we stripped in that time 80 by 30 feet of bedrock and cleaned up 201 oz. of gold, valued at $3,417, leaving a dividend, after paying all expenses, of $1,150. The ground is now fairly open, and this should be a paying property for the next fifteen years. The quantity of water obtainable depends entirely on the snowfall. Six men—two whites and four Chinese—were employed.

"On the Golden Gate property, on the same creek, we have eight men at work. The property is worked from a 60-foot shaft and, although the ground is not rich, the cheapness of labour during the winter will enable us to continue operations until the spring.

Keithley Creek.

"We are still prospecting the Onward Company's property on this creek and have now located the back channel in the hillside, 600 feet from the present creek bed. We are now running a tunnel and expect shortly to reach pay dirt.

Spanish Creek.

"The Moore Company's property on this creek is making a very good showing. Until lately four men have been at work and have been finding as much as 12 oz. of gold to a 10-foot set of timbers. The Company is now engaged in running an incline and installing new machinery, with the intention of working a large force of men during the coming season."

HEADWATERS OF CLEARWATER RIVER.

The following information as to operations on the upper Clearwater, from Mr. Thomas Drummond, C.E., explains itself:—

"In reply to your circular letter asking for information as to mining operations during the season I would reply as follows:

"I have been operating and making a working test on Hemlock creek, running into the north end of upper Clearwater lake. I built a flume 10 feet by 5 feet and 325 feet long, and put in a dam 10 feet high and 60 feet long, which carried the water of the stream and laid the bed bare. I spent between $4,000 and $5,000 and the returns were very disappointing on the whole, although I took out a little gold. It is a terrible country for boulders, both large and numerous, of glacial origin, which have simply filled the creek, making it practically impossible to work the bed of the stream or to prospect on the sides. Under such conditions as to remoteness and boulders the creek would have to be exceptionally rich, which it certainly is not, and even after the flume and dam were in it did not pay the expenses of mining. I write somewhat plainly on these points because my name has been flourishing in the papers (without any information or permission from me) in rather a misleading way; in fact it has been used to help 'boom' the Horsefly country."

NOTE BY PROVINCIAL MINERALOGIST.—A short description of the Clearwater and Tete Jaune Cache districts of this Mining Division will be found in some notes under the Kamloops Mining Division.

QUESNEL MINING DIVISION.

The following report has been received from Mr. W. Stephenson, Mining Recorder of this division:—

"In making this brief report I have the honour to state that I have been absent from this section of Cariboo District for the greater part of the mining season. The water supply has been very short, owing to the light snowfall and the small amount of rain during the summer, and in consequence the past year (1901) has been unfavourable for placer mining and hydraulicing. In some cases, I am informed, the water gave out entirely and the miners could not get enough to clean the ground they had sluiced away during the early part of the year, thus leaving them without any returns for the season's work.

"The development work done on claims and mining leases has been very limited.

"The reported discovery of new diggings on the headwaters of the Horsefly river has put some life into this part of the district and brings considerable work into the Record Office here, but I cannot yet give any authentic information regarding the new strike. I have seen some of the 'prospects' said to have been brought from this part of the country: these 'prospects' are certainly good, and, if obtained as told to me, and if reports are true, the outlook for a new and prosperous mining camp in the coming season is hopeful."

THE HORSEFLY DISCOVERIES.

The following regarding the recent discoveries of placer gold on and near the headwaters of the Horsefly river, in Quesnel Mining Division, Cariboo District, was collected and published in pamphlet form by the Department of Mines and distributed for the information of the public :—

Such general and widespread interest has been shown in the reports of the recent discovery of new placer fields in this portion of the famous old Cariboo District, and the demand for reliable information has been so great, that the Provincial Mineralogist set on foot enquiries, and, as the result of communications from the Gold Commissioners and Mining Recorders of the district, together with interviews with mining men and others from that section, he begs to submit the following as a digest of such information as has been received by the Department up to date:—

The news of these discoveries became public property only during November last, after the open season was over. It is as yet, therefore, rather lacking in detail, and is obtained from returning prospectors, who seem to have confidence in the discoveries, and who, having lived in a placer district and seen practical operations, ought to be able to view the ground from a thoroughly practical standpoint.

The ground in question may be roughly described as lying round the headwaters of the Horsefly river, and along the western slope of the range dividing the watershed of this river from the watershed of the Clearwater.

The following description of the property is believed to be reliable, and is given by one of the parties of prospectors which has just returned to Ashcroft:—

"ASHCROFT, B. C., 25th November, 1901.

"*The Honourable*
"*The Acting Minister of Mines,*
"*Victoria, B. C.*

"SIR,—The discovery was made by two prospectors, Alexander Sim and James Craddock, who left for the Horsefly river on a prospecting tour about the 1st June, 1901. From Ward's camp, on the Horsefly river (just above Harper's camp), they prospected very carefully, going up all the creeks, etc., emptying into the main river. On none of the streams emptying into the river on the north side did they find any gold, but on the McKinley branch and on Crooked river, on the south side, they got good prospects, though not such as to warrant them in stopping there. They therefore continued up-stream till they reached the main North fork, which they followed up, but found nothing. Returning, they then went up the South fork, with very encouraging results, so much so as to induce them to apply for a lease of one-half mile each, from the mouth of Campbell creek, up-stream. They then went on up-stream (getting good prospects all the way from the Forks) until they reached Eureka creek, where they each located a claim, in company with four others (Campbell and partners). As their provisions were running short they had very little time to prospect the ground, but hurriedly improvised a sluice box by felling a tree, splitting it in two, and hollowing it out with an axe to about three inches deep by eight inches wide. They then started shovelling in the dirt, and as a result, for the actual time shovelling in, they cleaned up at the rate of $25 per day to the man in rough, coarse gold of about the size of flaxseed. In addition to this, a lot of the gold must have escaped, owing to the crude manner of working, as on panning out the tailings afterwards they got several colours in each pan, and a lot of gold was visible in the indentures made by the axe in hollowing out their rough sluice box, in which they had only placed six riffles. After prospecting their claims, with the same result apparently all over them, they feel confident that there is a heavy run of gold all through the property, and believe the claims above and below them are just as rich.

"Some of the gold recovered contains quartz, and Fraser creek, where some prospecting has been done, is full of float quartz; indeed, from the indications in it and other creeks in the vicinity, there may be an immense body of quartz in the mountains in which all these creeks take their rise, and some good-paying veins may be discovered there next year, as such are evidently the source of supply to the neighbouring creeks and the whole Horsefly river. The country round Fraser creek has, apparently, never been prospected before, as no sign of a white man can be found there.

"The diggings are very shallow on Eureka, Empire and Fraser creeks, not being much more than two or three feet deep, and being what are termed 'poor men's diggings.' Further down the river the propositions are mostly of a hydraulic character, and require capital to develop them. From seven miles above the Forks to within half a mile of Eureka creek, there is a bottom of from a quarter to a half-mile wide, in which there is hardly any fall to the river, and from here down to the Forks there is a fall of about three feet to the hundred. Eureka creek is about eight to ten miles long. Empire creek, which is a tributary of Eureka creek, and empties into it about 750 yards from its junction with the South fork of Horsefly, is about one and a half miles long, and at the upper end descends very rapidly from the mountains. Fraser creek is about the same length as Eureka, and, although not prospected as much as the latter, is considered just as rich. All these creeks take their rise from a high range of mountains, about 6,000 feet high, which appears to be the dividing line between the Horsefly and Clearwater rivers. There is a large tract of country lying to the north, south and east of the new discovery that has never been prospected yet, and has probably never even been traversed by either Indians or whites. About 1,000 feet above the Forks, as well as on the South fork, Messrs. Barrett & Druker have been working last summer with very good results on a number of leases (7) purchased by them. The leases run up river three and a half miles, and Lucas has a lease of one-half mile adjoining them at the upper end, while above this again Sim & Craddock have two leases (1 mile), while next to these are four leases of one-half mile each, all of which are considered to be good property. Immediately below the Forks R. T. Ward & Co., of Horsefly, have made application for two 80-acre bench leases. There are several good roads leading into Harper's camp on the Horsefly river, which are accessible at any time of the year. Parties travelling up the Cariboo Road, with pack horses or on foot, will find the best and shortest route by the 108-Mile Road. Another road branches off at the 111-Mile Post, and connects with the first-mentioned one a few miles out. Another route, and the best for a team to travel, is by way of the 115-Mile Post. From the 150-Mile Post there is also a very good waggon road to Harper's camp, and from there on to Quesnel Forks, near which are situated the celebrated Cariboo Hydraulic Co.'s mines. From Harper's camp there are two ways of getting to the new discovery: one is by a trail which runs parallel with the Horsefly river to the Forks; thence across the North fork near the junction, where there is a good ford, and on up the South fork to Eureka. The alternative route is from Harper's camp to the landing on the lower end of Horsefly lake; thence up the lake to the upper landing, and from here across the pass to the forks of Horsefly river. The following table of distances is very nearly correct, as far as can be ascertained, viz.:—

"*Ashcroft to Harper's Camp.*

Ashcroft to 108-Mile House......	93 miles.	Ashcroft to 150-Mile House......	135 miles.
108-Mile House to Harper's camp..	48 〃	150-Mile House to Harper's camp..	35 〃
Total..............	141 〃	Total...............	170 〃

"*Viâ* 111-Mile House and 115-Mile House practically same as *viâ* 108-Mile House.

"*From Harper's Camp to Eureka Creek.*

"*By Trail up Horsefly River.*

Harper's camp to forks of Horsefly	50	miles.
Forks to Eureka creek	13	"
Total	63	"

"*By Horsefly Lake.*

Harper's camp to Horsefly Lake	6	miles.
On Horsefly lake (boat or on ice)	30	"
Upper end Horsefly lake to forks	12	"
Forks to Eureka creek	13	"
Total	61	"

"The trail by way of Horsefly river to Black creek is very fair and with a little work, cutting out brush, could be made a good trail. From there on it runs through timber (spruce and pine) and quite a lot of small brush, with plenty of fallen timber, which makes it very hard to get through with horses. It was originally cut through to a point four miles above the Forks. The last four miles of it are very bad, running alternately over little hills and through low, swampy places in which horses mire down, although they have been taken through on this trail to within eight miles of Eureka creek. A good trail, and not expensive to build and with easy grade, could be made by crossing over the South fork of the Horsefly, at the Forks, and following it up on the south side to Eureka creek. There is good feed (and water) on the trail from 108-Mile House to Black creek, but from there until the slide is reached (about five miles below the Forks) it is scarce, although sufficient can be got to take pack horses in with their loads and send them out again. The country abounds with game, caribou and deer being very plentiful, while the Horsefly lake is teeming with beautiful trout, some being caught of over twenty pounds' weight. At Harper's camp are two hotels, post-office, etc. About eight miles above, on the river, is Mr. Patenaude's farm. There are a few settlers further up the river, who do a little farming during the summer and find it profitable to do a little trapping during the winter season.

"There is a report that a mining engineer, named Thomas Drummond, who has been exploring on the east side of the divide, between Horsefly and Clearwater, has made a very rich find over there.

"I have, etc.,

"Joseph Wm. Burr,

"*Mining Recorder, etc.*"

From other sources it is learned that Mr. Drummond has taken up some leases on the Niagara river, which flows into the east end of Quesnel lake, and it is reported that the prospects obtained on these are very satisfactory.

Mr. John Bowron, Gold Commissioner, forwards the following letter from Robt. Campbell (late Road Superintendent), with the endorsement that he believes it to contain reliable information, as Mr. Campbell, being a practical placer miner, knows whereof he speaks:—

"Dear Sir,—I give you herein a brief sketch of what we found on the Upper Horsefly. You know that I, with L. S. M. Barrett and Mr. Druker, spent from June 1st until the middle of August in prospecting the leases held by myself and associates. The results were very satisfactory to the parties investing, as on every lease we obtained coarse, heavy gold in paying quantities, and I am assured this mail by Mr. Barrett that he will put on a $60,000 plant early in the spring. About October 1st I, in company with J. Stirsky, A. Sim, J. Craddock and Fred Tasse, made a trip up to the head of the South fork and, after five days' search, found gold in paying quantities on the creek now known as Eureka. This creek is about 70 miles from Harper's and 10 miles from where Barrett was working. The formation on the south fork and its tributaries resembles the formation about Barkerville very much, consisting of slate and quartz, with more float quartz than up your way; then the blue dirt is also identical and is highly impregnated with iron. On the main south fork I sunk a shaft through this blue dirt, which was 23 feet in depth. Gold was panned out of the gravel underneath, but we did not get to bed-rock, and water finally drove us out. I am sorry to see such excitement about this at present, because we had not time to thoroughly prospect it; but one thing is certain, good diggings, easy to work, are going to be struck during the coming summer. Our ground on Eureka creek will pay at least one ounce a day per man, and I cannot see but that there should be more and better creeks. The gold is heavy, though not very coarse, $1.25 being the largest piece obtained. I enclose a rough sketch of the country, showing the two routes taken to the upper river. Some money is badly needed to open up a trail in the early spring, as it is an extremely hard country to get about in. We shall take our supplies up in February, over the ice and up the lake. The altitude is somewhere about 4,500 feet, snow remaining on the peaks all the summer, and we were on 20 feet of old snow the day we got gold on Eureka creek. The timber is fir, spruce and balsam, and will make excellent lumber. I think there will be a good camp there in the course of a year, although many (and all who go in now) will be disappointed."

Other information received indicates that this region was prospected many years ago, and that no gold was found on the North fork, while on the South fork fair diggings were discovered. This, too, was in the 60's, when wages were $10 per diem and supplies cost in proportion, so that what were fair diggings in those days would be very good ones now.

The Horsefly river is not navigable for even canoes, and contains three falls of about 50 feet each, with much bad water.

Routes of Travel.

For the information of those intending to go in it may be said, that from Ashcroft, on the line of the Canadian Pacific Railway, a stage and express line is run semi-weekly in summer and weekly in winter, to Barkerville, with a weekly connection from 150-Mile House to Harper's camp all the year round, and, should the travel demand it, stages will be put on from 111-Mile House as well.*

The roads from 108-Mile House, from 111-Mile House and 115-Mile House join a few miles out, and although shorter they are not in as good condition for waggons as that from 150-Mile House.

There is also a trail from Kamloops, up the North Thompson river, leading to the watershed of the Clearwater, on the eastern slope of the range of gold-bearing hills. This trail is said not to be in very good repair, and to be difficult in time of high water, and, while not the best to reach the present discoveries, gives access to a country which is worthy of careful prospecting.

Pack horses and saddles can be had at Ashcroft, 111-Mile House, 150-Mile House, and elsewhere along the line.

Supplies.

Supplies of all kinds can be obtained at Ashcroft, at the current market prices of a town located on the railway, the stores carrying large stocks.

Special information has been received from the companies running the stores at 111-Mile House and at 150-Mile House, that they are getting in extra large stocks of goods preparatory to the expected increased demand, and the assurance is given that these supplies will be sold at fair prices, viz.: Ashcroft prices plus the cost of freight in. Assurance is also given that one company will, this winter, take in a supply of goods to the head of Horsefly lake, over the ice, and will run a store at the Forks, if needed.

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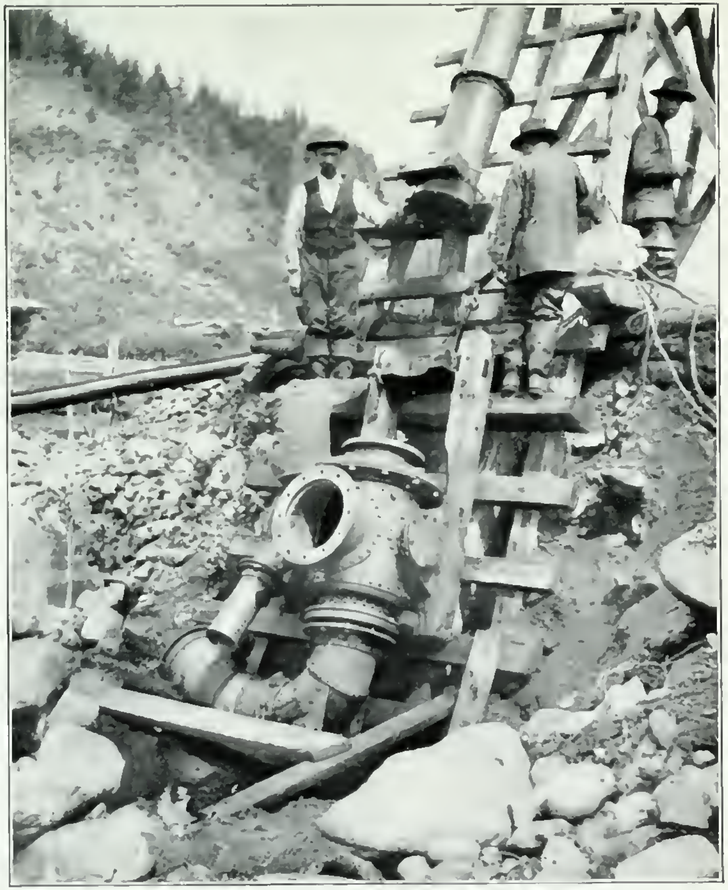
* Detailed information may be obtained from the B. C. Express Co., Ashcroft, as to time-tables and rates.

ELEVATOR PIT.



SETTING UP HYDRAULIC ELEVATOR.

43rd Co., OMINECA.

Laws.

Copies of the Act regulating placer mining in the Province may be had on application to the King's Printer, Victoria, or from any Mining Recorder, at a cost of twenty-five cents.

The Recording office for the Horsefly district—which is in the Quesnel Mining Division—is at Quesnel Forks, but should occasion demand it the Government will establish a Deputy Mining Recorder's office near the new diggings.

For the benefit of those not familiar with the British Columbia Mining Laws, the following notes are made:—

To locate, hold, or mine a placer claim in the Province a person must obtain a Free Miner's Certificate—cost $5 a year—obtainable from any Mining Recorder. Aliens may become free miners.

Every free miner may locate and record only one claim on each separate creek, ravine, hill or bar, but he shall be allowed to hold any number of claims by purchase. A free miner may act as agent for two other free miners, and may locate one claim for each as above, but before so doing he must have recorded in the office of the Mining Recorder powers of attorney to so act as agent.

Size of Claims.

A Discovery Claim—one discoverer—600 x 250 feet rectangle; to a party of two discoverers—1,000 x 250 feet rectangle. After "discovery" has been located on a creek, other claims shall be 250 x 250 feet.

The mining laws are very liberal, but demand strictly certain observances, so that one unfamiliar with the law should not go into the district without a copy of the Act.

Those entering the country *via* the Cariboo waggon road can obtain Free Miners' Certificates and copies of the "Placer Mining Act" from the Mining Recorder at Ashcroft, the point of leaving the Canadian Pacific Railway, and from the Mining Recorder's Office, Kamloops, if the Thompson river route is taken.

The fame of the Cariboo district generally is so great as to require only brief notice—it forms a part of the history of British Columbia.

In 1858 "placer gold" was discovered on the bars of the lower Fraser river; this gold was in very fine or very flat flakes, such as might have been carried far by the swift current of this river. The early prospectors followed the river up, tracing the gold to its source and finding occasional bars where the gold had concentrated sufficiently to form rich diggings. As the river was ascended the gold became coarser and more abundant, indicating the approach to the source. In '59, Charles Snyder and two others are credited with taking out $1,700 in dust in one day from a bar at the mouth of Quesnel river. In the same year gold was discovered on the lower Horsefly river in bars and benches.

Within the next couple of years, Keithley, Antler, Williams, Lowhee, Lightning and many other famous creeks were discovered.

Of these, Williams creek is said to have been the richest ever discovered in the world.

These creeks are all included in what was known as the Cariboo district, and which has produced about $50,000,000 in gold.

All the famous diggings of these earlier days could be included within a radius of some 25 miles, and within a few years were worked out.

The wash was deep on most of the claims and they were chiefly worked by "drifting."

The generally-accepted theory as to the origin of the gold in these various creeks is, that it has been derived from the washing away, by these streams, of some old channels of the Glacial age, but these old channels must, again, have derived their gold from a previous denudation of the country, with a consequent concentration of values.

To quote from Dawson, in the Report of the Geological Survey of Canada, 1887 (p. 47 R):

"The deep, rich leads of Cariboo evidently date from a period antecedent to that in which the country was for a time covered by a great ice mass, or are, in other words, pre-glacial, and lie beneath the boulder-clay and other deposits due to the 'ice age.'

"The wearing down of the country-rock and natural concentration of gold had been in process from the close of the Miocene or Middle Tertiary period (or perhaps, in some localities, even from an earlier date) to the Glacial period. During the period of the Middle Tertiary, a great part of the Province included between the Coast Ranges and Gold Range became occupied by fresh-water lakes."

These old channels of the Glacial period, although admittedly of at least secondary origin, may, for all practical purposes, be considered the source of the placer gold in our modern creeks.

The old channels do not necessarily follow the present streams, nor conform to the present topography of the country, except in so far as the topography is influenced and defined by the older rocks which also defined the topography in pre-glacial days; consequently, these old channels lie under all that deposit which is called the glacial wash, and it has been proved in many cases that even this glacial wash may again be overlaid by more recent volcanic flow.

The general area in which these old rivers flowed is fairly well bounded and defined in this instance, and, to again quote from Dr. Dawson, is "included between the Coast ranges and the Gold range," but the exact courses of these old rivers have not been fixed, except at isolated spots where they have been worked, as at the Cariboo Hydraulic, the Horsefly Hydraulic, the Miocene Hydraulic, and a number of other camps.

At these points the channels have been proven, and a large amount of speculation has been indulged in—arguing from the data obtained—as to their further course. Speaking generally, the trend of the main old river channels seems to have been N.W. and S.E., with smaller streams flowing in from the sides, and, of course, subject to the crooks and bends that are to be found in all streams.

These old channels are often of great width and at great depth. At the Miocene a shaft is down 500 feet and has not yet reached the bottom of the channel.

In the old channels, as in modern streams, the gold is not evenly distributed, but has accumulated where conditions favoured its collection.

These old channels form the bench claims and the greater number of the hydraulic claims of the country.

The modern water-courses have been formed by the cutting into and washing away of the deposits left after the Glacial age, when it often happened that the modern stream cut across or along the old channels, again concentrating the gold from the beds of the ancient stream in the bed of the new stream below the point of intersection with the old channel.

Hence our modern streams are spotted—rich in one place, but becoming sometimes absolutely barren a short distance above the intersection of the old channel. The modern stream may, too, have cut through the bed of the old one in several places, or may have cut more than one old channel, thus giving several rich spots. From this it follows that if a modern stream is rich in one spot it is no proof that there will be other rich spots, although the chances of such recurrence must be considered favourable.

Along the flanks of the old drainage area the old channels were not buried as deeply by the subsequent wash as was the case nearer the centre of such area, and, as the old and the new general drainage areas correspond, being bounded by the older mountains, along these flanks it more often occurs that the old channels have been cut by the modern streams, and here must be looked for the most probable ground for placer diggings.

As can be seen from a glance at the map, a line drawn S.E. from Barkerville, the famous old placer mining centre, would pass through the upper part of the Horsefly river, and consequently renders it exceedingly probable that new placers should be found in that section, which probability is not in any way discredited by the fact that a portion of this river above the old diggings has been shown to be practically barren.

The information available regarding the new discoveries on the Horsefly, as given, applies to but a limited area of country, but to the north-west and south-east of these new finds there is a great area of country in which similar geological conditions exist, and in which there is great probability that at no distant date still other new placer fields will be discovered.

OMINECA DISTRICT.

OMINECA MINING DIVISION.

REPORT BY FRED. W. VALLEAU, GOLD COMMISSIONER.

In submitting my annual report on the mining industry of the Omineca District for the season of 1901, I have the honour to say that, although little or no prospecting has been done this summer, the season has been a fairly satisfactory one, all things being considered.

The early portion of the season—embracing the months of May and June—was warm, with a very heavy rainfall, causing the snow on the mountains to melt rapidly and flooding the creeks, but from the end of the last-named month cool, dry weather set in and lasted until the end of the season, causing a shortage of water, consequently retarding work very much and in some instances forcing hydraulicing to close down.

There have been, this past season, six hydraulic mining companies working in the District, employing approximately 125 men (about one-third of whom were Chinese or Indians), but none of these companies are as yet upon a paying basis.

The smaller mines, worked by individuals, are in various stages of development, and both the companies and the individual owners seem to be most sanguine of ultimate success.

Below I beg to submit a short detailed report of the work being done in the District.

THE 43RD MINING AND MILLING COMPANY OF CARIBOO, LIMITED LIABILITY.

This Company carried on operations upon Kildare, Slate and Manson creeks this season, working its hydraulic elevator on both Kildare and Slate creeks.

A pit has been opened on Slate creek about 75 feet long, 40 feet wide and some 30 feet deep, and pay dirt found from within 2 or 3 feet of the surface to bedrock, which latter has been found on the north side of the creek but is still pitching on the south side of the pit.

The pay dirt on this part of the Company's property has every appearance of having been left in its present position by ice rather than being the wash of the present creek. From bedrock upwards for a height of 12 to 14 feet are a mass of large boulders and rocks tightly wedged together, with very little sand or gravel between them, in fact in some places large vacant spaces are to be found. On the top of this a wash of gravel lies and above this again is found slum and the bed of the present creek.

Up to the present no indications of either cemented gravel or blue clay have been found.

A pit was also opened on Manson creek, upon ground leased from the Artic Slope Mining Company, and hydraulicing was carried on for about three weeks, but from returns received from this venture it is doubtful whether work will be continued next season on this property.

The hydraulic elevator being found necessary for the working of Slate creek, work had to be closed down on Kildare creek for the season, and, consequently, a couple of weeks' valuable time was lost, and the amount of gold recovered was less than expected.

No trouble whatever was experienced this season with the long line of ditch and flume owned by the company, the water being turned in at the commencement of the season and used day and night until work ceased this fall.

A very complete electric light plant, operated by water-power, has been in use this season to light the workings, and the telephone system has now been extended over the whole length of the main ditch line, with a number of 'phones and call bells connected with the head office.

The company did not suffer from any shortage of water, the ditch system being perfect and the water supply abundant.

A large quantity of steel piping and supplies of all sorts have been brought in this season and are now stored at the mine. A residence and office for the manager was built this summer, besides a store-house and tool-house.

THE ARCTIC SLOPE MINING COMPANY.

This Company's operations this season were confined to the *Black Jack* property on Manson creek. No work has been done on the Germansen creek or Pete Toy's bar claims.

Hydraulicing was continued throughout the season with the exception of about two weeks when, on account of shortness of water, work had to be suspended.

From a statement received from the company I find that the amount spent in labour, transportation, etc., this year is said to be about $15,100.

A 4-foot flume, 360 feet long, was built at a cost of $5,000.

No buildings were erected. Sixteen men were employed for the greater part of the season.

BREAD WINNERS GROUP (owned by E. G. Tilton, Victoria).

These claims, situate on Manson creek, have been worked continuously by Mr. Tilton from the commencement of the season until September when, on account of the shortness of water, work had to be stopped.

The principal work was ditch construction and preparing of the ground for mining on a large scale next spring.

Pits have been opened on Poplar gulch and upon what is generally believed to be the newly-discovered "ancient channel" of Lost creek. A few days' hydraulicing was carried on at both places with very gratifying results.

The old channel of Lost creek has been definitely traced for several hundred feet. It is known to be 75 or 100 feet in width and over 65 feet in depth, and there is no indication thus far of its containing either clay or hardpan. Coarse gold is found throughout the gravel from the surface to 65 feet below and no doubt reaches bedrock which has not yet been found, but is now supposed to be but a short distance below the depth given above.

Another ditch, to bring water from Lost creek, will be constructed next spring, and this will ensure these claims having an ample supply of water.

THE NEWITT CLAIM.

This claim, situate on the east side of Lost creek and adjoining the rear of the *Bread Winners*, was taken up a year ago by Mr. Charles Newitt. This property is believed to cover a portion of the ancient channel of Lost creek below the mouth of the canyon.

A prospecting shaft has been sunk a considerable depth and pay gravel found. This season has been devoted to running a tunnel from the edge of the creek into the hill with the intention of tapping the channel. Mr. Newitt and his partner are remaining on the ground this winter to continue the work of tunnelling.

A comfortable dwelling-house has been erected and provisions and supplies sufficient for a year have been taken in and are now stored at the mine.

A hundred thousand dollars were recovered from a claim just above this point, in the bed of the creek, by a company of miners in the early days, and as very little pay has ever been found below the canyon it is generally thought that Lost creek went through the hill where this claim is now located.

ST. ANTHONY EXPLORATION COMPANY, GERMANSEN CREEK.

The greater part of this season's work has been devoted by this company to prospecting its claims on the above-mentioned creek. Twenty-two men were employed; 521 feet of prospect tunnels were run, and a shaft 90 feet in depth was sunk. Six miles of ditch were also repaired, and 1,750 cubic yards of gravel were mined with fair results. Office buildings, a store-house and water-power saw-mill have been erected, and a complete hydraulic plant is now upon the ground. This is the only company operating on Germansen creek this season

VITAL CREEK.

Vital Creek Mining Syndicate. This company employed some 15 men during the season, the work carried on being principally prospecting. The management reports that work was greatly retarded by shortage of water consequent upon the unprecedented dry weather, but, taking this into consideration, the results obtained were most satisfactory. The gravel shovelled into the sluices is said to average $6 per cubic yard. Preparations have been made for the installation of a hydraulic plant next season. A large quantity of supplies are now on hand at the mine, and it is the intention of the company to place its property on a paying basis as soon as possible.

THE CALEDONIA MINING COMPANY.

This company was granted a lay-over of its property for the past season by the Minister of Mines; consequently, no work has been performed.

The Ah Yok claim has been worked by an old Chinaman for several years past, but little more than wages have been taken out by him this year.

TOM CREEK.

The Mayflower Mining Company. The owners of this property have been engaged in actual mining all the season, the greater portion of the time being devoted to ground sluicing and disposing of a large amount of boulders, as bedrock proved to be much deeper than was at first anticipated. All dirt had to be shovelled three times before reaching the boxes, but even then, for the time shovelling-in was carried on, it paid at the rate of from $8 to $10 per day to the man. This claim has cost its owners a large amount in money and labour, and the Messrs. May, Lyon and the Condits deserve great credit for the manner in which they have opened up this property. Six men have been steadily employed during the season and, for a time, a still larger force was put on. In October, when I last visited this mine, the owners showed me that the bedrock was rising ahead of them, so that next year they hope to have much better results.

The Messrs. Condit are remaining on the property this winter intending to run a prospecting tunnel upon another portion of the ground.

Sing Fan Claim. This is a creek claim owned and worked by a Chinaman, who reports having made very good wages during the latter portion of the season, but I find it almost impossible to get exact information from Chinamen as to what they are actually making.

Another claim taken up on this creek this season was also worked by two men, who report that they have just about made wages, but nothing more.

THE MCKINNON MINE, LOST CREEK.

This mine has been worked by Mr. McKinnon this year, but owing to the dryness of the season and the scarcity of labour he was forced to suspend mining operations, and consequently his returns were smaller than expected. The mine, however, paid the expenses of working.

THE EVANS CLAIM (PLACER), MANSON CREEK,

Has been represented throughout the season by Mr. Evans, two men being employed by him the greater part of the time. The work consisted principally in opening up a new cut on the west bank of the creek, and prospecting the property.

FALL RIVER.

Ten leases of ground on Fall river were granted to different parties last year, but nothing has been done upon them up to date.

TWENTY-MILE CREEK, OMINECA RIVER.

A lease has been granted the Messrs. Cullan and Bowman for ground on this creek, and development work, it is expected, will be carried on upon this property next season.

PEACE RIVER.

No mining has been done this season on the Peace, Findlay or Parsnip rivers. A report on this portion of the district I have already had the honour of handing into the Department. (*See* below.)

OFFICE STATISTICS—OMINECA MINING DIVISION.

Free miners' certificates	$ 254.75
Rentals on leases	3,987.50
Mining receipts general	986.90
Trade licences	10.00
Revenue tax	291.00
Total	$5,530.15

SPECIAL REPORT ON THE PEACE RIVER DISTRICT.

BY F. W. VALLEAU, GOLD COMMISSIONER.

SIR,—I have the honour to submit the following report of my visit to the Peace river during the past summer, pursuant to instructions received from the late Minister of Mines.

I left Manson Creek on the 20th July, going by way of Stuart lake and Fort McLeod, accompanied by Mr. Gavin Hamilton, who was also going to the Peace river in the capacity of census enumerator.

I chose this route, as I found it impossible to secure any Indians willing to go into the Peace river country from Hazelton or Babine. The reason of this was the existence of a feud between the former and the Siccanees or Stick Indians, whose hunting ground is in that portion of the district. From Manson to Stuart lake, a distance of about 125 miles, I followed the Manson-Quesnel trail. The country between the above-named places is of a rolling character, the greater portion having been swept by fires, the result of which is that it is covered with fallen timber and a second growth of small jack pine and poplar. The trail crosses a large number of creeks, in none of which, as far as I could ascertain, has gold been found in paying quantities.

The surface shows a heavy wash of boulders and gravel southward from Manson to within about 30 miles of Fort St. James, when the character of the country changes and becomes more level, with large tracts of open prairie and hay meadows. The only considerable height is Lookout mountain, about 25 miles north of Fort St. James.

From Lookout mountain to Fort St. James the timber consists of poplar and cottonwood, with a few white birch, some of the latter being quite large. Grouse and fool-hens are very plentiful along the trail, but we shot very few, owing to most of them having their young with them. I was obliged to camp on the trail for a day and a half on account of heavy rains, and reached Fort St. James, a Hudson Bay post at the south end of Stuart lake, on July 26th.

I remained two days at Fort St. James, buying provisions, and secured two Indians for the trip to Fort McLeod. Our party was joined here by Mr. Fox, H. B. C. agent at Fort Grahame, Findlay river, who was returning to his post after his annual trip to St. James.

From St. James to Fort McLeod the country is almost level, well timbered with pine, spruce and poplar, and dotted with innumerable beautiful lakes. The soil for 30 miles east from Fort St. James is very fertile, pea-vine and wild timothy growing to a height of four feet in many places. The trail, although grown up with young pines and willows, is a good one, and there is a fine hard bottom for nearly the whole distance. This trail is only used by the Hudson's Bay Company for transporting supplies from Fort St. James to their outlying posts. A few years ago a small number of prospectors used it to reach the Peace river, but none have passed over it for the last three or four years.

The second day out from St. James we passed Lac-a-Long and crossed the river of the same name. I fished at the ford here, sitting on my horse, and caught half a dozen fine trout in less than 20 minutes. My men told me they had heard of some fine falls in the river some distance below, so I tied my horse and walked to them, securing three photographs. I was well repaid for my scramble through the bush, as the falls are perhaps the most beautiful I have ever seen. They are about 80 feet in height and some 60 in width, and the Hudson's Bay officials say I am the only white man not in that service who has ever visited them. I caught up with my party at Iroquois river, the scene of an Indian massacre some time in the 60's. We reached Fort McLeod on Friday, the 2nd August, in time for dinner.

After dinner, I arranged the hire of a canoe for myself and party, Mr. Hamilton being already provided for, and took some views of the H. B. post and also of the lake.

Lake McLeod is about 16 miles long, but narrow, and the shore line is broken by a number of bays, some of which run back for a couple of miles.

After purchasing sufficient provisions to last the party to Fort St. John, I left McLeod next morning in a very cranky "dugout." The lake at this point empties into the Pack river, which we descended and entered the Parsnip about 3.30 p. m. The Pack is a small, swift stream, in some places almost blocked with drift-wood.

The Parsnip is a fine river, about 200 feet wide, the water being clear but of a grayish green colour. Fish are wonderfully plentiful for its whole length, ling, char, trout (rainbow, brook and Arctic), being caught wherever a fly was cast. This river, when in flood, evidently rises very high, as the banks are caving in and driftwood is piled all along, in some places to the height of 25 to 30 feet. The banks are for the most part loam and vegetable matter, yet, on the bars, wherever I panned, I got a large quantity of black sand thickly studded with particles of fine gold. The timber is principally cottonwood and poplar along the river banks, but spruce predominates on the hills.

My men shot two fine deer, which gave us a nice change from bacon and fish. We also shot a black bear, but he managed to reach the brush, where we lost him.

MT. SELWYN, PEACE RIVER, FROM PARSNIP RIVER.

CANOE RUNNING PARLE PAS RAPIDS.

On Sunday, August 4th, I got my first view of the Rockies and took some photos. Flies of every description had been very bad since leaving McLeod. The timber on this portion of the river is smaller than that higher up, and banks of gravel appear on both sides.

At 3.30 p. m. we passed the mouth of Nation river, at which point it is not nearly as wide as at the crossing of the Manson-Quesnel trail, some 110 miles further up stream.

The next day, Monday, August 5th, we reached the confluence of the Parsnip and Findlay rivers, the headwaters of the Peace river proper. For the last 25 miles the Parsnip is very crooked, and along both banks for this distance tremendous land-slides are met with, which have brought down rocks and trees and piled them on either side.

At the mouth of the Parsnip I was hailed by some Indians on shore. Upon my landing they told me that some of their party were very ill and begged for medicine. After diagnosing their cases as well as I could, I gave them some medicines from the chest which I have always been obliged to carry with me while travelling in the Omineca country, as both the whites and Indians appear to think the Government Agent of the district should embrace, among his other duties, that of dispensing physician. These Indians, however, unlike the Siwashes at the coast, seemed most grateful for what I did for them, and offered me meat and fish, which I refused. I was, however, compelled to accept a pair of moccasins.

The view from the confluence of the Parsnip and Findlay rivers is very beautiful. Away to the west can be seen the high, pointed tips of the Omineca range, while to the east the Rocky mountains give one the impression that it is impossible for the Peace river to force its way through them. Looking down the Parsnip river when about 5 miles from its mouth, I imagined its junction with the Findlay was a considerable distance away, but I soon found that I had also been looking up the valley of the latter, whose course, as it approaches the Parsnip, is in directly a straight line with it.

The two last-mentioned rivers joining form the Peace. At the time of my visit the Parsnip was very low, while the Findlay was in flood. From the Indians I found the reason for this was that, in the north, up to a week or ten days before, the weather had been cold, but warm rains had set in, causing the Findlay to be high at that time. At the junction, islands have been formed of drift-wood and wash, brought down year after year, and below the islands the river is anything but safe for navigating a canoe, as from the foot of these to the Findlay rapids it is one succession of tremendous swirls, requiring that a craft, such as I had, should be very carefully handled.

The Findlay rapids, which we ran, occur about three-quarters of a mile from the junction of the two rivers above mentioned. They are about 220 yards in length, the river being over a quarter of a mile wide, while large masses of rock are scattered over its bed. Out in the centre it would be impossible for any boat to run the rapids without being swamped, but by hugging the south shore very closely and swinging sharply into a small bay at the foot we got through safely, taking in very little water. At the foot of these rapids is a tremendous whirlpool, about 300 yards in diameter, which has to be avoided by keeping close to the shore. After passing the rapids the river widens out considerably and the current settles down to a rate of about 4 miles an hour. I camped for the night about 7 miles below the rapids, but to this point saw no signs of cabins along the banks or other indications either of the presence of men or of mining having been carried on.

At 7 a. m. the next day, August 6th, we again started down the river, and shortly after leaving camp I found a cache on the south bank, just at the foot of Mount Selwyn. I landed here and followed a trail for a distance of 2½ or 3 miles up the mountain, where I found indications of prospecting having been carried on. These occurred in three places. Open cuts had been made in each instance, cross-cutting the ledges, which are composed of a white quartzite, in all three places about 15 feet in width. Samples of this quartz, together with others gathered on my trip, I brought back with me and have handed to Mr. Robertson, Provincial Mineralogist.

At Mount Selwyn a good house had been built, and a large quantity of tools of all kinds shipped in, together with provisions, but the place seems to have been deserted at a moment's notice. Everything was scattered about in the greatest confusion, and I thought, at first, that some one had broken in after the miners had left. However, when I reached the workings, higher up, I found drills, crow-bars, picks and shovels dropped about anywhere. A good bellows, anvil and a lot of other blacksmith's tools were in place beside one of the cross-cuts, without any covering over them, and boxes of powder, caps and fuses were lying under a tree near by. The latter were all ruined by exposure to the weather.

Near the bank of the river is a cache built on poles, containing provisions and tools of all sorts, but these also have been spoiled by rust and mildew. I could find no posts or inscriptions, so am unable to say which of the claims located at Mount Selwyn I visited. These workings are the only ones I found either on my way down or on the return trip, although I followed the south shore going and came back along the north.

The Rocky mountains proper begin just below Mount Selwyn, and are well named, as from their base, at the river, to their summits, they are bare of trees, in many instances not even showing signs of grass or ferns. The summits appear to be 5,000 or 6,000 feet high.

The current at this point runs at about the rate of 5 miles an hour. Below the Parle Pas (Don't speak) rapids the river takes a sharp turn to the south for a couple of miles, when the appearance of the country changes entirely. Although very steep, the mountains seem covered with grasses to their summits. The Parle Pas rapids are formed by a sudden drop in the bed of the river of some 10 or 12 feet and, I believe, at high water are almost "drowned out." At low water the rapids can be run by keeping close in to the north shore, to which the current sets very strongly, accompanied by large waves. We lightened our canoe at the head of these rapids and I walked down to the foot awaiting its arrival. The men got through safely, but were washed high and dry on the beach by a wave which caught them when about half-way down. From this point the Peace river widens out and the banks are generally low for a short distance, until the base of the mountains is reached.

We struck camp the next day at 7.30 a.m. and reached the Peace River canyon about noon. Although the wind was down stream, we could hear the roar of waters fully half a mile before coming in sight of the gap. Coming down the river we swung round a point, when the whole stream suddenly seemed to disappear. It was not until we had passed a small sand-bar and I saw the opening running into the south bank that I could tell where the outlet was. The river, above the canyon, is fully half a mile wide and in places a mile, but at the canyon it suddenly narrows to some 200 feet while passing through the chasm. The rocks on each side of the canyon are water-worn to such an extent that in some places they overhang 20 or 30 feet.

At the mouth of the canyon there were piles of driftwood on the rocks, 60 feet above the level of the water at the time of my visit. showing to what a tremendous height it must "back up" during the time of flood. I took quite a number of photographs, both at the entrance to the canyon and as far as I could go along the rocks.

After having lunch we pulled our canoe out of the water and hid it in the brush, about 20 feet above the level of the river, covering it over with boughs We also made a cache of everything we could do without, as we had a portage of 15 miles round the canyon to Hudsons Hope. At that point we hoped to get another canoe with which to continue our journey to Fort St. John, some 65 miles below the lower end of the canyon.

We started across about 3.30 p.m., glad to be on the move, as the mosquitoes and black flies were something awful. We camped for the night near the only water to be found on the portage, a small creek about half-way across. The next morning we left camp at 7 o'clock, and in two hours and a half reached Hudson's Hope, only to find it abandoned. The trail from the camp to Hudson's Hope was tramped down by bear and moose, some of the tracks showing quite fresh, but we did not meet any of the animals.

There being no chance of obtaining a canoe, as expected, at Hudson's Hope, we followed the bank of the river. The banks here rise steeply to a height of about 150 feet, when they form a terrace wooded with pine timber. Open spots of prairie, here and there, give the country a beautiful park-like appearance.

About 3½ miles down the river we found dry standing timber, so I immediately set the men to work cutting down trees, preparatory to making a raft upon which to continue our journey to Fort St. John. While my own and Mr. Hamilton's men were thus employed, I made camp and cooked supper, and by 9.30 p.m. we had our raft, oars and everything completed. The raft was 26 feet long and 9 feet wide. At this point I may mention that the mosquitoes and black flies were the worst I have ever experienced, although I have spent the greater portion of 20 years in the bush and on the prairies.

The next morning, August 7th, at 7 o'clock, we commenced our journey on the raft. As the wind was blowing down river we hoisted a sail made out of a pair of blankets, which sent us along at a good rate, in fact, sometimes threatened to run us under water. Just below where we camped, or about four and a half miles below the canyon, there is a large flat on the north side of the river. This runs for about two and a half miles and extends about a mile back to the foot-hills, which are covered with bunch-grass. Judging from the banks and the height of the pea-vine and grass, the land is of the first class. A few scattered trees grow here and there, just sufficient to make it picturesque. Below this the river is divided by two rocky islands which rise perpendicularly to the height of 70 feet or so, and are covered on top with a dense growth of spruce. These islands are formed of beds of sandstone lying horizontally, the bottom ones being about 4 feet thick and decreasing in size until at the top they are not over half an inch thick. This sandstone is very fine-grained, and from samples brought down I find it is very suitable for the manufacture of grindstones. On the rest of the route to St. John the river generally has sloping banks, with cliffs here and there composed of a dark blue slate mixed with clay.

We arrived at Fort St. John at 6.15 p.m. that evening, where I found that Mr. Bedson, the H. B. Co.'s officer in charge, and who is also Deputy Mining Recorder, had gone to Peace River crossing for his year's supply of goods, and was not expected back for three weeks. The man in charge informed me that the post was completely out of provisions, with the exception of a very little canned stuff and some dried moose meat, which he was keeping to feed his dogs. I bought half a dozen cans of beef, and at length prevailed upon him to part with a little of the dried moose meat. While here I learned that there were 12 or 15 men hunting and prospecting on the South Pine river, about 200 miles from St. John, and also that they had reported finding some very rich copper ore. These men came into the Province by way of Edmonton, and have not taken out any free miners' certificates.

Fort St. John is now situate on the north bank of the river, having been moved across from the opposite side some years ago. The post is built on a level bench about 20 feet above the river, and consists of a dwelling house and store. The situation is a very pretty one, the soil good, and if taste were displayed the surroundings could be made extremely pleasant. Grain and roots of all kinds grow well and ripen here. The hills, on both sides of the river, are grass-covered, but bare of trees. Quite a number of Indians were at the post awaiting the return of Mr. Bedson.

Owing to Mr. Bedson's absence, I could not obtain any information regarding mining matters, as the man in charge knew nothing about them. There being no provisions available, I decided to commence the return trip as soon as possible.

The next morning, after a great deal of persuasion, I managed to get a canoe for myself and men and made a start at 4 p. m. The canoes we had coming down were bad enough, but the one obtained at St. John was worse. However, we got up to the mouth of Moberly river, opposite which we camped for the night. It took three and a half days' hard poling and tracking to reach Hudson's Hope from St. John, as, while the Peace is a beautiful river for descending, it is a hard one to travel up. There are very few eddies to help, and poling is bad, the bottom being covered with large boulders. Owing to the width and swiftness of the river we had to keep to one side, which made it impossible to keep away from the bad places and log jams which, in some instances, were very dangerous. The water in the river had risen some two feet since we came down.

We reached Hudson's Hope about noon and had lunch, consisting of the last of the dried moose meat and a duck, which we had shot that morning, boiled. Our tea and sugar had run out two days before. After lunch we started for our cache at the head of the canyon, 15 miles away, reaching it at 8 p. m. after a very hot afternoon's walk. The cache was found in good order, but Mr. Hamilton, not having thought it was necessary to cover his canoe, found it split from end to end. Mine, however, was in good order. Luckily, my canoe was larger than necessary so he and his men were able to come with me to the mouth of the Parsnip. The next morning, Wednesday, 14th August, at 9 o'clock we left the head of the canyon and reached the mouth of the Parsnip five days later. Here I parted company with Mr. Hamilton, who procured another canoe and went up the Findlay river to Fort Grahame, while I continued my way up the Parsnip. Once in the Parsnip we made better time, as poling was much better and we had more tracking. Here again we caught all the fish we could eat, so were well off for provisions.

Four days and a half after leaving the mouth of the Parsnip we reached Fort McLeod, where I found my pony, which had fattened up very much during the 20 days I had left her there. We stopped at the Post, and I bought provisions to take us back to St. James.

The next morning at 9 we were once more on the trail and made 18 miles that day, going into camp at 6.15 p. m. Starting again at 6 a. m., we travelled until 6.30 p. m., with one hour's rest for lunch, and reached Salmon river, where we camped for the night. This river is about 50 feet wide, and empties into the Fraser 40 miles above Fort St. George.

Starting early the next day, we reached Fort St. James at 6.30 p. m., where we took a day's rest. While there I wrote some letters as there was a chance of sending them out, and on the 28th started for Manson with one man and a pack horse. While on my way back I examined the work being done on the Manson-Quesnel trail, and found that, under Foreman Steele, exceptionally good value had been obtained for the money expended. I returned to Manson on the evening of Sunday, the 1st September, having been gone six weeks and one day.

The distances travelled were as follows :—

Manson to St. James	125	miles.
St. James to Macleod	90	„
Macleod to mouth of Parsnip	120	„
Mouth of Parsnip to Canyon	70	„
Over Canyon Portage	15	„
Canyon to St. John	70	„
Total	490	„
Return to Manson	490	„
Total distance travelled	980	„

PEACE RIVER, BELOW THE CANYON.

LOOKING DOWN PEACE RIVER CANYON.

CASSIAR DISTRICT.

REPORT OF J. D. GRAHAM, GOLD COMMISSIONER.

I have the honour to enclose herewith my annual report on the mining operations carried on in the Atlin, Bennett and Chilkat Mining Divisions for the year 1901 :—

ATLIN LAKE MINING DIVISION.

Since my last report there has been a considerable falling off in the placer and mineral Records in this Division, due in a great measure to the miners trying other fields of activity in the Yukon district.

Another reason is the cost entailed in working properties in this district, which becomes greater each year as the shallow ground becomes exhausted ; indeed, it is only by the use of the latest methods in hydraulicing that good wages can be obtained.

The trouble experienced in previous years between the placer miners was absent this year, but it appears to have broken out in another form amongst the large companies, although, I am pleased to say, this has occurred in only one locality and will, I think, right itself next season.

I have to report one stampede this year to Volcanic creek, which is situated at the head of Fourth of July creek ; it does not appear, however, that there was very much to warrant it.

The Atlin camp, from a business point of view, has been more satisfactory this year on account of the men who were willing to work being able to obtain employment. Claim-holders, too, appear to be better satisfied with the outlook for their prospects next year.

The season was late in opening this year and continuous high water interfered to a great extent with the owners of creek claims.

Quartz mining has attracted a little more attention this fall, by reason of the uncovering of a ledge of free-milling rock on the *Discovery* placer claim on Pine creek, and it is the intention of the owners to proceed with the development of the ground this winter. A trial shipment of two tons was made to Vancouver, but up to date no returns have been received. Should this discovery come up to expectations, development work will be undertaken to prove whether the ledge is continuous, and a considerable number of men will be employed this winter.

Placer Mining.

Pine Creek.

Ordinary individual placer mining or sluicing has fallen off on this creek, and the work is passing into the hands of hydraulic companies which have purchased many of the placer claims and have installed the necessary flumes, etc., for the more economical working of the ground. What little work has been done by these companies indicates that most of the Pine creek ground can be worked at a profit by them. The only difficulty to be contended with will be the disposal of tailings when active operations are begun, and I consider that the carrying capacity of Pine creek is limited during high water.

Considerable drifting was done last winter on Gold Run and Pine creeks, which, however, did not prove remunerative except to those who worked at the mouth of the former.

ATLIN AND WILLOW CREEK MINING COMPANY.

This Company has been working its group of claims on Willow creek with fairly good results, and has also worked a large group of claims on the south bank of Pine creek, known as the *Caledonia Group*, which I understand has proved fairly good. These claims have been consolidated into hydraulic leases, which will enable the company to work them to much better advantage.

On the Willow creek claims about seventeen hundred feet of ditches and flumes, and sixteen hundred feet of bedrock flume with riffles were constructed, and a boiler and steam pump were installed. The Company has worked out between six and seven placer claims. On the *Caledonia Group* two hundred and fifty feet of flume with riffle boxes, etc., have been constructed, completely laid down with two strings of sluice boxes. About one and one-half claims have been worked out. Average number of men employed, 20.

SUNRISE HYDRAULIC MINING COMPANY.

This Company has acquired by purchase a large number of placer claims which it intends to work in connection with its leases. This step was necessary in order to afford access to Pine creek. Above Nugget point, on Pine creek, this company helps to work a considerable number of placer claims on a "lay," but operations have been stopped by litigation, which is still pending on an appeal.

This company has done the largest amount of work in the Atlin camp, but I regret to say that difficulties have beset it all through and the closing of its ditch, early in September, did a lot of injury to miners who could ill-withstand it.

The formation of the Pine Creek Power Company will be a great benefit to the camp next season, unless contentious litigation interferes.

STEPHENDIKE HYDRAULIC SYNDICATE.

The owners of this group of leases have done considerable work in getting the ground ready for working next year. The order issued early in September retarded this company and prevented it from getting water to work its ground this season, otherwise it might have obtained some returns for its two years' hard work. This, no doubt, will be remedied next year by the power company mentioned, which will furnish the necessary water to work this ground.

THE "RACE HORSE" GROUP.

This group of leases was worked during the winter months, the work consisting of shafts sunk to test the ground. From information received from the secretary of the company, the results were entirely satisfactory. Capital is needed to work this property, and from information received it appears probable that this will be forthcoming.

THE ATLIN LAKE COMPANY, BIRCH CREEK.

Little or no individual placer mining has been done on this creek during the year. The following information has been furnished by the company's manager:—"Dead work was completed during the freshet of June and July, since when the property has been self-supporting with the low water. The average depth of gravel in the face does not exceed 10 feet. The amount of gravel washed through the sluice boxes this season is 10,000 cubic yards. Twenty boxes, twelve feet in length each, have been placed forward and sunk in bedrock and the dump extended 144 feet. Two hundred feet of ditch for a by-wash flume have been constructed. The average number of men employed during the season was 16."

Boulder Creek. This has been the most active creek this season for individual placer mining. About 150 men have been at work and the results obtained have, as a whole, been very satisfactory.

About 2,000 feet of ditch have been constructed and 1,300 feet of sluice boxes installed by individual miners. The creek is very expensive to work by reason of the immense number of boulders to be handled.

The De Lamare Syndicate.

The above company is the owner of 15 leases and 20 creek placer claims. It has had a good deal of difficulty this year by reason of mud slides into the bedrock flume. About one-half mile of supply flume has been constructed and 900 feet of pipe have been laid. The average number of men employed during the season was 29. Just before having to close down, by reason of the shortage of water, the company encountered good pay on bedrock.

On Ruby creek an option was taken on some ground extending up-stream from the mouth, but the property, being non-productive, was abandoned.

Wright Creek. The results expected from this creek have not been realised and did not equal the returns of last year. The work was considerably retarded by the lateness of the season and, by reason of the very high altitude, the ground retaining the frost until July.

Considerable work has been done by the men who worked on the upper portion of the creek, but with poor returns. About 3,000 feet of ditch were dug, through which they intend to convey the water to their claims, and about 50 feet of fluming were also put in.

Pendugwig Syndicate.

This Syndicate is the owner of leases at the lower end of the creek. Prospect holes were sunk during the winter months with a view to locating the pay streak, and during the season the plant was moved further down. The results, so far, have been unsatisfactory on account of failure in reaching bedrock. It is the intention of the company to further prospect the ground this winter.

Otter Creek. No placer miners have worked on this creek during the past season. Messrs. Moran and Carmichael are operating some leases on the upper portion of the creek and the following is the report of their operations:—

During the summer a ditch was constructed fourteen hundred feet in length and twenty-two hundred cubic yards of gravel, which paid well, were washed. It is intended to further prospect the ground to locate the pay gravel.

Spruce Creek. This creek has not progressed to any great extent, but at the same time individual placer miners have done a large amount of work and the results obtained have been satisfactory. High water and the great depth to bedrock has been the chief hindrance. All are, however, hopeful of better results next year.

About 100 men have been working on the creek this season.

The Columbia Hydraulic Mining Company.

This Company acquired, late in the summer, certain leases situated opposite the mouth of Dominion creek and for the short time it has been at work has shown great energy in exploring the ground. The following is a report of the work done:—

Two thousand feet of flume, 4 feet wide and 2 feet deep, and 1,500 feet of ditch, 4 feet wide and 3 feet deep, constructed; 1,000 feet of piping laid and one derrick, 65 feet high, erected. Average number of men employed, 15.

BLUE CANYON PARTNERSHIP.

This is a party of men who have done a large amount of work this season on their claims by way of opening them up and obtaining a supply of water. The following work was done during the year :—

A water ditch one-eighth of a mile in length 2 feet deep and 4 feet wide, a considerable portion of which had to be blasted out of solid rock, excavated ; 264 feet of flume, 32 inches wide and 2 feet deep, with 8-inch block riffles, constructed, and commodious houses erected for the workmen. The average number of men at work was 15.

All lumber used by the partnership was whip-sawed and hauled on the snow last winter a distance of four miles to the workings.

The Consolidated Spruce Creek Placers Company, Limited, is acquiring by purchase certain claims on Spruce creek and it is the intention to push the work of development next year, and other lease-holders are getting their properties in condition by putting in ditches, flumes, etc., for working next season.

The Canyon Creek Company hauled in pipe, etc., to its ground with dogs during the winter and worked its properties until the water gave out. It is the intention to improve the properties so that water can be stored for use during next year.

McKee Creek. Very little mining has been done on this Creek this season by individual placer miners, and the few who did work have since disposed of their properties to the Atlin Mining Company.

THE ATLIN MINING COMPANY.

This Company has installed a complete hydraulic plant this year at a cost of about $30,000, complete water supply pipes, flume, ditch and bedrock flume have been put in, and all through the work is of a substantial character. About 800 feet of the creek bed has been worked out this season. The average number of men employed was twenty.

THE CHRISTOPHER SYNDICATE.

This Syndicate owns some creek and bench leases on this creek. The following work has been done :—Twenty-five hundred feet of a supply flume line, with a four-foot base, graded, and a pipe line ten feet wide and one mile long cut out and graded. Twenty-five hundred feet of sixteen-inch pipe, for hydraulic mining purposes, have also been placed on the ground.

Graham Creek. A few miners worked on this creek but, with the exception of the owners of the *Discovery* claim, did not get any returns. The owners of *Discovery* made good wages for a portion of the season.

Mineral Claims.

There had been a falling off in prospecting for quartz this year until the discovery of free-milling rock in Pine Creek led to considerable staking.

The work of the various claim-holders is set forth below :—

The *Yellow Jacket Group* on Pine Creek is still in Court pending a decision as to title.

No work has been done on the *Imperial Group* on Munroe mountain since the Crown grants for the same were issued.

On the *Anaconda Group* no work has been done since the Crown grants were issued.

The *Laverdiere Group* is situated at the south end of Atlin Lake. The owners have expended about $10,000 in development work, which has proved that the vein is to be found at depth. The property has been bonded to Montana parties through Mr. Caplice, and work is being pushed ahead.

RAZOR-BACK MOUNTAIN ATLIN LAKE.

THE "LUCKY BOY," 110 BELOW SPRUCE CREEK, ATLIN.

The *Macdonald Group* on Indian creek is a copper proposition, and so far is improving as the work progresses. The owners of the property intend working it all the winter.

Big Canyon Group. Considerable work has been done on this group, situated on Fourth of July creek. The ore is galena, and the owners anticipate hauling down such as they have on their dump to Atlin lake this winter and forwarding it on to the smelter when navigation opens.

Many new locations have been made this year, but nothing more than is necessary to obtain certificates of work has been done upon them.

The Engineer Mining Company has done considerable work on its property, consisting mainly of tunnelling and cross-cutting the ledge matter.

BENNETT LAKE MINING DIVISION.

Report by T. Des Brisay, Mining Recorder.

Although fewer mineral claims have been recorded than in the previous year, yet there has been a large amount of actual development work done on the various properties throughout this Division, especially in the vicinity of the Big Horn river on the west of Taku arm. All the properties in this portion of the Division, together with the *Gleaner Group* of claims on Lake Tutshi, are undoubtedly very promising. These claims are located quite a distance up the mountain side, necessitating the widening of old trails and the cutting of new, which occupied the first part of the season.

Messrs. Maher and Gleason, owners of the *Emerald No. 2*, *Evening Star* and *Utica* claims, put in a small stamp mill at the beginning of the season and have already shipped out about 200 lbs. of concentrates for assay purposes.

The new properties discovered in the vicinity of Bennett lake this year have made a good showing and a considerable amount of development work has been done.

The assessment work on the *Gridiron Group*, owned by Messrs. Whitfield and Hildebrand, has been completed and it is intended to apply for a Crown grant. This ore has assayed high and the owners are satisfied with their success.

On the west side of Taku arm considerable development work has been done on the *White Moose Group* of mineral claims, which is owned by White Pass Railroad officials.

The following work was performed:—Two shafts 14 feet deep sunk on the *Tennessee* claim; a tunnel driven 35 feet into the bank and another tunnel on the adjoining property driven 60 feet; open cut 40 feet and another tunnel 22 feet. The values are in copper.

There has been nothing done in the way of placer mining in this Division during the season.

Office Statistics—Bennett Lake Mining Division.

Records of mineral claims	21
Records of placer claims	89
Certificates of work	21
Bills of sale, etc.	12
Leaves of absence	128
Groupings	5
Free miners' certificates	237

Revenue Collected.

Free miners' certificates	$927 75
Mining receipts	692 45
	$1,620 20

CHILKAT MINING DIVISION.

REPORT OF W. J. RANT, MINING RECORDER.

PLACER MINING.

The expectations raised by the rush to the Bear Creek district in September, 1900, have, I regret to say, not been realised, owing to the abnormal rainfall during the summer.

Many of the claim-owners were on the ground at the opening of the season, only to find all attempts to work advantageously hopeless, on account of the high water in the creeks.

Seeing no near prospect of getting to work, the miners had their claims laid over and went out, intending to return as soon as the water subsided; many did return, but still the high water impeded their efforts, and the climax was reached when, early in September, the water rose higher than ever, and carried away nearly the whole of the results of their summer's labour.

A few continued to work, and are still on the creeks, but have achieved very little so far, although the water is now lowering rapidly, and we might expect to obtain brighter prospects later but that the season is so far advanced. Placer mining in this Division cannot then by any means be considered as proved a failure, since the non-success in 1901 has been directly attributable to the unusual rainfall and spring freshets.

Some work has been done lately on a few claims on Glacier and Boulder creeks, but as the titles to these claims have not been confirmed, no recording has been done at this office, and I have no particulars of the operations.

QUARTZ MINING.

Assessment work has been recorded on most of the claims located in this District and, with few exceptions, this is about all that has been accomplished. The work done, however, shows encouraging results. Owing to the cost and difficulty of transporting the material and provisions required, the lack of capital, and the fact that these claims are owned by a comparatively few individuals, the development of this locality is not so rapid as might be desired.

OFFICE STATISTICS.—CHILKAT MINING DIVISION.

Records of mineral claims issued	17
Records of placer claims issued	22
Certificates of work issued	49
Re-records of placer claims issued	15
Documents recorded	41
Leave of absence granted from, representing	158 claims.
Grouping and representation permits granted	17
Abandonments issued	6
Documents filed	9
Dredging leases applied for	2
Free Miners' certificates issued	273
Special Free Miners' certificates issued	1

REVENUE COLLECTED.

Free Miners' certificates issued	$1,310 00
Mining receipts	886 50
Total	$2,196 50

NORTHERN PORTION OF CASSIAR DISTRICT.

(INCLUDING TESLIN, LIARD AND STIKINE MINING DIVISIONS.)

Under date of 4th November, 1901, the Gold Commissioner of the District, Mr. James Porter, reports as follows:—

The Liard Mining Division is the most important portion of this District, and all the well known gold-producing streams of the early days lie within its bounds. No new discoveries of any consequence have been made this year, and, in fact, such work as is in progress is being conducted on extensions or continuations of the old "pay runs" of the long-ago-discovered creeks, the greater portion of the Division being very far from thoroughly prospected.

The operations of the Thibert Creek Mining Company, Limited, of Thibert Creek, did not meet with the success that was anticipated, many difficulties arising and interfering with the progress of the work. The management, however, express themselves satisfied and confident of a successful run next season. (*See* note by Provincial Mineralogist below.)

In the Stikine Mining Division no discoveries of any importance have been made, with the exception of the location of a few placer and quartz claims, the former on Cave creek (a tributary of the first north fork of the Clearwater river, which in its turn is tributary to the Stikine, entering it from the north below Telegraph creek) and the latter in the vicinity of the same stream. Seven or eight men are spending the winter in the neighbourhood in order to drift on the mineral ledges referred to and ascertain their value.

There are a few other mineral claims in this division, but nothing beyond the necessary assessments has been done upon them.

This, like other portions of the District, is but little known and prospected, in fact all the large and extremely mountainous portion lying to the west of Telegraph creek, on both sides of the Stikine, has never yet been entered by white men owing to the difficult and almost impenetrable nature of the country.

In the Teslin Lake Division no great activity has taken place. Three or four quartz claims have been recorded.

THIBERT CREEK MINING COMPANY.

NOTE BY THE PROVINCIAL MINERALOGIST:—Through the courtesy of the local secretary, Mr. Griffiths, the following account of the working of this Company has been extracted from the admirable report made by the manager, Mr. Alexander Hamfield, to the Directors.

The property consists of 7 hydraulic mining leases of 80 acres each, consolidated and having a total frontage on Thibert creek of 10,500 feet.

With the necessary permission the assessment work on the group has been also consolidated and has been duly recorded for all leases since the issuance of same.

The water rights of the Company consist of:—

Berry	creek	3,000	miner's inches.
Boulder	"	1,000	"
5-Mile	"	1,000	"
Little Delaire	"	500	"
1st Fork French	"	500	"
2nd "	"	300	"
Tributary of Dease	"	400	"
Total		6,700	"

Two men wintered at the mine to complete the installation of the plant and to have everything in readiness for the spring.

On March 8th, 1901, an advance party of 9 men left Victoria, travelling up the Stikine river on the ice and reaching the mine on April 8th. This party got the flume, pipe and plant generally into shape but were greatly handicapped by the lateness of the season.

The manager and two men left Victoria on May 26th with the year's supplies, arriving at the mine on 19th June, having been delayed at Wrangel and Telegraph creek.

The plant at the mine consists of a 6,400-foot flume and 1 pressure box, 1,200 feet of riveted pipe line, 10 inches to 14 inches diameter, with 2 10-inch cast iron valves, 2 No. 2 Monitors and 2 sets sluice boxes and undercurrents, saw-mill (6,400 feet B. M. capacity), 15 H. P. engine and 20 H. P. boiler, retort, furnace, scales, etc. The estimated cost of this was $50,000, and the actual cost $45,543.62, partly made up as follows:—

Excavation and tools	$ 7,668 07
Flume, lumber and construction	11,109 08
Saw-mill, boiler and engine erected in place	6,729 68
Piping and monitors, and laying same	6,651 86
Roads, trails and buildings	2,251 34
Management, surveys and salaries to August 1st	6,713 66
Sluice boxes and undercurrents	1,867 63
Retort	362 99
Diversion of waters, scales, lights, etc	2,289 31
	$45,543 62

Considerable difficulty was experienced with the flume and bed. On those portions of the grade where the timber, moss and brush had been removed the underlying soil still held the ice and frost of centuries which, when the warm weather came on, gradually thawed out, causing the flume bed to settle in these places. This is an occurrence not likely to happen again, but it caused heavy maintenance expense last year.

The pipe line consists of

450	feet of	14-inch pipe,	No. 14 B. W. G.
450	"	12 "	" "
300	"	10 "	" "

Total 1,200 feet.

The pipe is riveted in 15-foot sections so as to be easily moved when re-laying the line.

The two No. 2 Monitors are double-jointed and capable of handling together 600 miner's inches of water every 24 hours.

Sluice-boxes 5 feet wide and 30 inches deep are now placed in each pit; these are made of 1½-inch plank, the bottoms being lined with 12-inch blocks, and the sides with 1-inch boards. The grade of sluice was 11 inches in 12 feet, but was increased to 13 inches in 12 feet with riffles spaced at 2 inches.

The undercurrents were made of 1½-inch plank, 24 feet long and 10 feet wide, riffled with 3 by 4 scantling.

The loss of quicksilver in sluices and undercurrents amounted to 8 per cent. of the total amount used.

Transportation.

During the summer 21 tons of goods were sent up to the mine, costing $270 per ton for freight, of which $200 was for packing from Telegraph Creek to the mine. This expense seems excessive and could be greatly diminished if a waggon road was built by the Government, or if a greater number of companies were working in the District.

The travelling expenses alone this year amounted to $3,281.96.

Stores.

At the close of the season some $9,771.18 worth of stores, including lumber, were on hand, with which to begin next spring's operations, so that fresh supplies will not have to be taken in until the trails are in the best condition.

Labour.

An average of 20 men were employed in the mine during the summer, and great difficulty was found in getting these as there are practically none in the District. The wages paid were $3 per day for mining and $2.50 for ordinary labour, with board.

The manager impresses on the Company the importance of water as the chief factor in hydraulic work, and the necessity of having, during the whole working season, a steady and plentiful supply, and he goes on to recommend the conversion of a lake, etc., into reservoirs by the construction of dams, giving detailed plans, etc., for such work, which is not of public interest.

Operation of the Mine.

The water was first turned on on June 11th and continued until July 7th, with one monitor only. The work consisted chiefly in removing surface dirt for a proper setting of monitors and a first set of large sluice boxes. From the 7th to the 30th of July water was turned off while a rock cut 150 feet long and 30 feet deep for a bedrock flume was being made. Washing was resumed on July 30th and continued until September 9th, with one pit only opened. From the 9th to the 18th of September the force at work was engaged in opening up No. 2 Pit, after which time, on account of the shortness of the supply, the water had to be stored in a temporary dam at the saw-mill, and was only enough for a 12-hour run per day.

From *No. 1 Pit* 60,000 cubic yards of gravel, giving satisfactory results, have been washed.

No. 2 Pit was opened later, and is a great improvement upon No. 1. There is here a bank 20 feet high with 2 feet of very good gravel on bedrock, being about 40 feet of bank to wash in all. This pit was started late in the season, and it was only possible to work for 8 days of 24 hours, in which time some 9,200 cubic yards of gravel were washed, yielding very gratifying returns, the average coming up to that of the prospecting of 1899. Only half of the bedrock could be picked up, the rest being covered in again with gravel wash and left till next year.

A complete record was kept of the hours run and of the amount of water used, as follows:—

Forty-five days' (of 24 hours) washing: 19,350 miner's inches of water used, which equals an average of 430 miner's inches of water used per day of 24 hours; 60,000 cubic yards of gravel moved from Pit No. 1, and 9,200 cubic yards of gravel moved from Pit No. 2; a total of 69,200 cubic yards, or $3\frac{57}{100}$ cubic yards of gravel moved with one miner's inch of water.

The actual time that washing can be carried on will vary with the season, but it is safe to count on from June 1st to October 10th, or about 100 days for actual washing and 30 days for cleaning up.

The season's work has proved the gravel in the old channel to be much greater than was expected, and the management calculate that, under the most favourable circumstances, it will take from 25 to 30 years to work out that contained in the 7 leaseholds.

The total expenditure, at the mine only, to 1st November, 1901, is :—

Installation of plant	$45,543 62
Operating and developing	11,295 87
Stores and lumber in stock at mine	9,771 18
	$66,610 67

SKEENA RIVER MINING DIVISION.

(A Division of Cassiar District under the jurisdiction of the Victoria Gold Commissioner.)

REPORT BY JNO. FLEWIN, MINING RECORDER.

I have the honour to submit herewith my report on mining matters in the Skeena River Mining Division during the year 1901.

The advancement made during the year has been most satisfactory, although the hope expressed last year that certain properties would become shippers has not been realised. A very large amount of development work has been done, and several claims, which were only prospects twelve months ago, are showing up well. Observatory inlet, particularly, promises to become a good camp in the near future. The ore is principally chalcopyrite and pyrrhotite, carrying a small silver and gold value, and is contained in a mineralised schist formation. These bodies of ore appear to lie close to salt water, and this fact, minimising as it does the cost of transportation, will materially affect the development of the camp.

The volume of business has greatly increased during the year, the number of mining documents recorded in the Port Simpson office, and the mining receipts themselves, being treble those of the previous year and equal to the combined returns of the preceding three years.

The outlook is certainly bright for the ensuing year, and I confidently anticipate a considerable influx of prospectors.

Mr. H. Carmichael, Provincial Assayer, paid a visit to Kitsilas camp, and also to the Queen Charlotte Islands, during August and September, to look over the general mineral features of those sections.

KITSILAS CAMP.

Ptarmigan Group.

On this property fifty men have been employed during most of the season, and some $20,000 expended on the following work :—Re-timbering shaft consequent upon changing same from an incline to the vertical; erecting gallows frame for horse winze and installing same; stoping 10 x 40 feet at 100-foot level; sinking shaft a further 50 feet and timbering same; driving cross-cut to tap lode; prospecting with diamond drill and boring 350 feet, north and south, at 100-foot level; sinking 27 feet on shaft No. 2 and boring with drill 29 feet on lode; sinking 30 feet on open cut No. 6; boring with diamond drill on lode at surface, 30 feet; doing considerable open cutting and surface prospecting; prospecting with diamond drill on *Ptarmigan No. 2;* on the *La Tosca* mineral claim, open cutting, surface prospecting and driving two tunnels, one 5 x 7 feet, 29 feet long, and one 4 x 6 feet, 32 feet long; surface prospecting on *Missouri* mineral claim; building cabins, tool-house, assay office and drill-house, and constructing pack trail for a distance of 6½ miles, with switchback, six feet wide, at a cost of $2,200.

Ormonde Group.

On this property the following work has been done:—Lode stripped for 50 feet; two open cuts 8 x 5 feet run; surface prospecting and re-building trail and cabins; whole group surveyed preparatory to Crown-granting. Total amount expended $2,000.

The *Hickey Group* consists of the *Golconda*, *Four Ace*, *Golconda Fraction*, *McKinley*, *Laurier*, and *Fraction* fractional mineral claims. In addition to surface prospecting the owners of these locations have had them all surveyed.

In the Kitsilas camp there were upwards of one hundred prospectors at work during the year, and a number of locations were made, but no new discoveries of any importance were reported.

ECSTALL RIVER.

Bluestone, Belle-Helen, &c.

On this property, owned by the British Columbia Pyrites Co., of Victoria, John Bryden, President, R. H. Swinerton, Secretary, upwards of $2,000 have been expended in actual development work during the year, and the property is looking well. A survey of the group has been made in addition to the following work:—One 6 by 7-foot tunnel, 67 feet in length; north drift, 8½ by 10 feet, 19 feet long; south drift, 10 by 12 feet, 10 feet long; 10 feet of shaft; 60 feet of stripping on ledge, and 68 feet of sinking with diamond drill. Number of men employed, 15.

Across the divide from this property, and on the Douglas channel side, some very promising looking chalcopyrite ore was discovered late this fall by Messrs. McMillan and Millar.

TELKWA RIVER.

On the *Forrest Group* of mineral claims operations have been carried on steadily during the season, and the following work accomplished: One tunnel on the *Naiad* mineral claim, 36 feet in length; 1 tunnel on the *Oread*, 17 feet in length; 1 tunnel on the *Discovery*, 40 feet in length; amount expended, $1,500.

On the *Big Blue* mineral claim, which adjoins the first named, and is owned by Messrs. Loring, Hankin and Forrest, a tunnel has been driven for thirty feet at a cost of $600.

Coal.

A large coal area exists on the Telkwa river, and the coal is said to be of an excellent quality. Three leases are held by the Skeena Development Company, which has done considerable prospecting. Several licences were also taken out last year by Messrs. Murray, Hall and associates, while during the past season the Limin-Davies Co., of Hamilton, Ont., has staked 30 leases, and applied for licences for the same.

A new coal field is also reported at Kispiox river, a northern tributary of the Skeena above Hazelton, which is now being explored by Dr. T. A. Wilson, of Port Essington, and associates, who are making arrangements to instal a diamond drill outfit on their property early in the spring.

LORNE CREEK.

The owners of the *Dry Hill* placer claim sold an interest therein early in the season to Messrs. Holt & Barger, of Greenwood, B. C., who have placed a small saw-mill plant on the ground, intending to cut lumber during the winter for fluming. In the early spring they propose to erect a substantial flume to convey water to the claim from Lorne creek. The property is known to carry gold values, but great difficulty has been experienced in the past in procuring a sufficient water supply; it is hoped by the owners, however that they will now be able to remedy this by taking water directly from the main creek and not depending upon the small tributaries.

Two new records were made on Lorne creek this year by Mr. S. A. Singlehurst, of New York, viz., the *Swiftwater* placer claims *Nos. 1* and *2*. Two interests in the *Hardscrabble* placer claim were also sold late in the fall by Mr. J. Haptonstall, to parties from Kootenay, who intend to do considerable development on this old location during the coming season. It seems probable that more work will be done on Lorne creek within a short time than has been the case for many years.

KITIMAT ARM.

Golden Crown Group.

This property continues to improve as it is developed. It is situated about 4½ miles from Kitimat arm, nearly behind the Indian village, and is approached by a good waggon road which has been constructed by Messrs. Steele & Dunn, assisted by a Government grant. The ledge itself, which is about 20 feet wide, appears in the wall of a canyon on Wa-hugh creek. The gangue is of quartz, with values in copper, gold and silver. The owners have driven some 20 feet on the vein and in addition have constructed cabins, a blacksmith shop, etc., and stripped 100 feet of the ledge.

Paragon and Porcupine.

On these two claims, also owned by Messrs. Steele & Dunn, the following work has been done:—32 feet of rock cutting, 4 feet wide and 7 feet deep; ledge stripped for 12 feet; 50 feet of cuts, 7 feet wide and 11 feet deep, made in gravel and rock.

Several new discoveries of copper-bearing ore, some samples of which assay well in gold and silver, were made during the season between Kitimat townsite and Lake Lakelse. These ledges will be further prospected during the coming summer.

GRIBBELL ISLAND.

Empress Group.

On this group, owned by the Canadian-American Mining Company, development work has been continuously prosecuted during the whole season and upwards of $6,000 have been expended, principally on a 300-foot tunnel to tap the main ledge. It is the intention of this Company to resume work early in the spring.

Copper Cliff Group.

On this group, owned by the Gribbell Island Copper Company, of Fairhaven, Wash., 180 feet of tunnel have been driven on the *Copper Cliff* claim and a large amount of trail work done. The total amount expended was $5,000.

Some 40 men have been employed in this camp, but the owners of properties here do not appear to have been successful in striking any considerable ore bodies, although they have expended a large amount of money in development work.

PRINCESS ROYAL ISLAND.

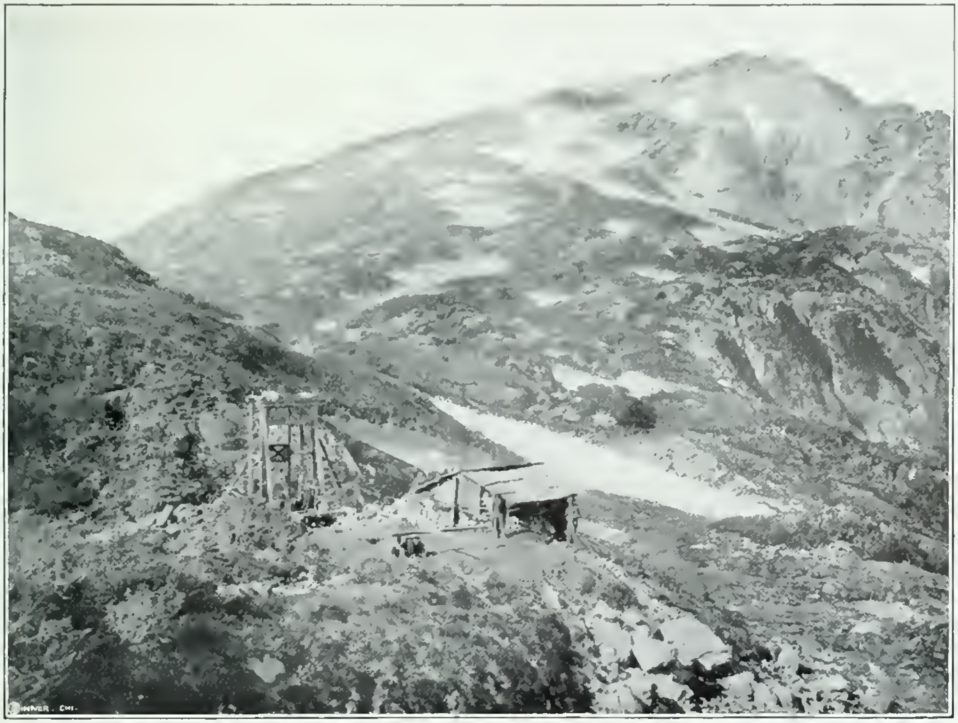
La Cuivre Group.

This group, consisting of *La Cuivre*, *Twin Peaks*, *D. L. S.* and *Uta* fraction mineral claims, is owned by E. A. Cleveland and Geo. A. Kelly, both of Vancouver. Eighty feet of tunnel were driven on this property during the season and a survey made of the claims, preparatory to Crown-granting them.

Bluff Group.

The *Bluff*, *Bench*, *Gulch*, *Lake Fraction* and *Mountain Fraction* mineral claims, constituting this group, were located in April last by the owners of the just-mentioned property, who have had them surveyed, and are now applying for a Crown grant. In addition the following work has been done:—Shaft sunk on the lode 45 feet, with upraise of 20 feet; one tunnel driven on the upper vein for 48 feet; lead stripped and tunnels faced: amount expended, about $4,000.

SKEENA RIVER.



PTARMIGAN MINE, BORNITE MOUNTAIN, SKEENA RIVER.

The *Monte Cristo Group* consists of the *Monte Cristo*, *Maud*, and *L. S. D.* mineral claims. Two tunnels have been driven on the ledge in solid rock for 30 feet, at a cost of $600.

On the *St. Patrick Group*, owned by Geo. A. Kelly and consisting of the *St. Patrick*, *Teddy* and *Bay View* mineral claims, an incline shaft has been sunk on the ledge for 6 feet, and a cross-cut tunnel has been driven for 18 feet.

Sadie Group. On this property, consisting of the *Sadie*, *Excelsior* and *Princess Royal*, one of the first groups of locations on Princess Royal island, a 5 by 7-foot tunnel has been driven for 60 feet, at a cost of $1,200. A survey has also been made of the claims and a Crown grant applied for, but as the owners of the *Homestake* group have adversed the application, the matter stands in abeyance in regard to the *Sadie* and *Excelsior*, pending a settlement in the Supreme Court. This does not affect the *Princess Royal*, the remaining claim of the group. The property is under bond to a syndicate of eastern capitalists, who are represented by Mr. Jas. Findlay, of Vancouver, B. C.

Homestake Group. This property, consisting of five claims and adjoining the *Sadie Group*, is owned by Messrs. M. McMillan, W. Howden, B. J. Cliff and R. W. Nowell, and is under bond to the same syndicate as the last-mentioned property. Three hundred and fifty feet of tunnel, 5 by 6 feet, have been driven on the *Homestake* lead, and 50 feet of 5 by 6-feet 4-inch tunnel on the *Bonanza*, besides which a large amount of surface work has been done. This is a promising property, the values being in copper and gold. A great deal of work has been done by the company having the bond, the final payment on which falls due in April 1902.

QUEEN CHARLOTTE ISLANDS.

On Moresby island, on the *Skincuttle Entrance* mineral claim, Mr. Heino has sunk a 6 by 6-foot shaft, 15 feet deep, showing a body of chalcopyrite ore.

On the *Golden Gate* mineral claim, same owner, a 6 by 6-foot shaft has been sunk 17 feet.

A number of new locations have been made in this section during the past season by Messers. Heino, Hendrickson, Grant, Harper and Jas. Raper, and I look for considerable activity here during the coming season.

DUNDAS ISLAND.

On the *Silver King Group* the owners have performed statutory assessment work, consisting of one cross-cut in rock and earth, 5 by 7 feet by 96 feet long; and one 5 by 5-foot cross-cut 20 feet in length. Little or no prospecting has been done on the island during the year.

OBSERVATORY INLET.

Great activity has been manifested here and several discoveries of large bodies of low-grade ore are reported. The camp is very favourably situated as regards transportation, timber and water-powers are abundant and convenient, and the seasons are long and fine, the snowfall being moderate and the winters not severe. Harbours, also, are plentiful and safe. Arrangements are now being made with the C. P. R. to have steamers call at Bonanza City once a month. The SS. "Boscowitz" also makes occasional calls there, when freight or passengers warrant it, the camp being only 35 miles off the regular steamboat route.

Bonanza Group. This property is situated on Ecswan (Goose) bay, on the west side of the Hastings arm of Observatory inlet, and about thirty-five miles from the mouth of Naas river. It seems to be located on a large mineralised zone of copper-bearing schist. The property was bonded early last summer to Mr. M. K. Rodgers, who has since done a large amount of work on the group, and is continuing operations during the winter. He has had an average of ten men employed. A number of substantial log houses have been erected for men's quarters, mess-house, blacksmith shop, assay office, &c. Up to the end of the year over $10,000 had been expended on the property in the following work:—Upper tunnel on *Bonanza* driven 60 feet, with a cross-cut 20 feet, and a lower tunnel 50 feet, all in ore; bed of the gulch leading up to the location line from *Bonanza* No. 1 Post blown up for 250 feet, exposing ore all the way; cross-cut in rock and earth run over 100 feet on the same claim. On the *Emerald* mineral claim two tunnels have been run, one eight and the other fifty feet. Ore is found almost continuously in all these workings, and averages 4½ per cent. in copper, with a small silver and gold value.

Thirty-five new locations have been made within a radius of 5 miles of the *Bonanza* since midsummer, some of them showing a high-grade copper ore. Notable amongst these are the *Hidden Creek Group*, owned by Messrs. McMillan, Rudge and H. C. Flewin; the *Castle Group*, owned by J. E. Stark and D. A. Robertson; and the *New El Dorado*, owned by the Flewin brothers.

Ten miles lower down the inlet several locations were made by the latter parties late in the fall on a very large ledge, and the same men also extended their researches to Portland inlet, where they discovered a body of carbonates of copper and lead, from which no assay returns have as yet been received.

On Alice arm, Observatory inlet, Messrs. Noble, Collison and McCullagh, and some Indians, have located 40 mineral claims. The showings here are galena and copper, but I have been unable to ascertain the assay values.

On the *Ophir* and *St. George* mineral claims, owned by Robertson and Rudge, a cross-cut has been run across the ledge, exposing a large body of ore, principally pyrrhotite.

Observatory inlet has experienced quite a boom this year, over 100 new claims having been recorded, and next season it is expected that a large amount of work will be in progress.

UNUK RIVER CAMP.

This new camp is situated in the northern section of British Columbia, near the International Boundary line, on Unuk river, which empties into Burroughs bay. It has been known to some of the old placer miners for many years past that the bars and benches of this stream and some of its tributaries carried more or less gold, but it remained for Messrs. Ketchum and Lee Brant to penetrate this "terra incognita" and locate the first mineral claims there. In company with Messrs. Ceperley, Mackenzie and Rounsfell, of Vancouver, B. C., they are now the owners of the two groups below mentioned, on Sulphurets creek, a south fork of the Unuk river.

Globe Group.

This group consists of the *Globe*, *Dartmouth*, *Victoria* and *Vancouver*. The owners have installed, at considerable trouble and expense, a small stamp mill with a capacity of three tons per twenty-four hours, with concentrating table and copper plates. The motive power is an over-shot wheel 13 feet diameter, developing 10 horse-power. The ledge is stripped for 400 feet.

Cumberland Group.

On this group two 5 x 6 tunnels, each 50 feet long, have been run and 30 tons of ore stoped out ready for shipment; 35 miles of trail have also been built. On these two groups over $8,000 have been expended.

REPORT BY H. CARMICHAEL, PROVINCIAL ASSAYER.

The following is from the report made by the Provincial Assayer, Mr. H. Carmichael, of a trip made by him, under instructions from the Department of Mines, to inspect the mineral development of this section :—

KITSILAS CANYON.

The name Kitsilas canyon, as here employed, refers to the section of country immediately adjacent to a gorge of this name on the Skeena river, some 77 miles above Port Essington. The canyon is formed where the river cuts through a rocky barrier, which runs across the valley, the banks of the stream being solid rock and rising some 30 feet above the water to a comparatively level plateau, which extends back to the base of the mountains.

The height on the north-west or right hand side of the river is Kitsilas mountain, near which are the remains of the old Indian village of Kitsilas, while on the left bank or south-east side is Bornite mountain, on which the most important of the mineral claims recorded are situated.

The eastern peak of Bornite mountain has been called O. K. mountain, as it is said that the snow, while melting in spring, remains in parts in such a way as to form these two letters in white, a fact regarded by the prospectors who are looking for signs as a happy and encouraging omen for the success of their enterprises.

I must here point out that certain parties have tried to shift the name "Kitsilas" to the south-eastern mountain, which is incorrect, as the name is clearly given by the late Dr. G. M. Dawson, on his map, to the mountain on the north-west side in latitude N. 54° 37′ 6″—and this conforms with the local usage and traditions of the Indians.

From Bornite mountain, looking due south, a beautiful view is obtained of the Skeena river, with its numerous tree-covered islands, as it winds its way through the valley and is finally lost to view in passing through a cliff in the snow-clad range of the Coast mountains some 70 miles away.

At the base of Bornite mountain and at the lower entrance of the canyon the Hudson's Bay Company have a post and warehouse pleasantly situated on a flat on the east side of the river.

At this point all steamers bound up stream stop, the distance from Essington being, as already stated, about 77 miles. The Skeena up to this point is easy of navigation for any ordinary river steamer, but the canyon presents difficulties of swift current and sharp turns, calling for experienced navigators and smaller boats of considerable power. That these difficulties are not insurmountable is proved by the fact that there are in summer 3 steamers which regularly run up the river as far as Hazelton, a total distance from Essington of 180 miles.

These boats run regularly from Essington during the period of open navigation, or from about May 1st to about the middle of October. There is a period of about two weeks—when the river is in flood—that no boat can pass the canyon; during this period the passengers, etc., are transported round the canyon by road and take another boat above the gorge. The Hudson Bay Co.'s steamers, such as the "Caledonia," a fine big boat, found it impossible to pass the canyon except at the middle stage of the water, and it was accordingly declared unnavigable except at such time. The Government therefore built a first-class waggon road around the canyon, a distance of some 2¼ miles. Other parties, however, afterwards built boats with more power and better suited for the purpose, and ran the canyon regularly, the result being that now no freight is portaged and the road is abandoned, except for the period above mentioned.

While the question of transportation may be considered as satisfactorily settled, when navigation is possible, there is a long winter season when everything is frozen up and the district is cut off from the outside world.

This hindrance would be largely obviated by the building of the railway from Kitimat arm, for which a Provincial charter has been granted and for which the surveys have been made. I met at Kitsilas a party of the surveyors who had worked through from Kitimat and they reported having found a quite feasible location for this road.

HOT SPRING, SKEENA RIVER.

I examined a hot spring, situated on the left bank of the Skeena river, about five miles above Port Essington. The water issues from the side-hill about 30 feet above the average river level, and had a probable flow of 1½ to 2 cubic feet per minute and a temperature of 38° centigrade. A rough, wooden bath has been erected by Mr. Cunningham, of Port Essington, and is well patronised locally. An analysis of the water in the laboratory gave the following result:—

Total solids	64	grains per gallon.
Chlorine	1.7	"
Sulphur	11.2	"
Sodium (as chloride)	44.8	"
Lime and magnesia	traces.	
Potasium	none.	
Heavy metals	none.	

PLACER MINING.

In the early days placer gold was found in several of the creeks in this section, notably in Lorne creek, by miners bound for the Omineca country.

The following information regarding the earlier placer work on Lorne creek has been given to me by an old-time miner in the district, Mr. Samuel Booth:—

"Lorne creek was first discovered by Harry McDame (after whom McDame creek, near Dease lake, is named), who stopped at the entrance of this stream on his way out from the Omineca and found gold a little way above the mouth. Upon his arrival in Victoria, McDame was taken ill and went to the hospital. When he came out in the spring, being "broke," he applied to Samuel Booth for help, telling him of his discovery. Booth fitted him out and sent him up to prospect, with instructions to try the different creeks along the river on his way. This was in 1884. McDame first found gold on a creek about 4 miles above the canyon on the left side of the river (Chimdemash creek). Here he worked for some time and, although getting some gold, was not satisfied and went on until he reached Lorne creek. He located claims here, about a mile above the mouth, for the Booths and himself, and these claims have been worked ever since by the former, McDame having died in the meantime. The claims, in the early days, paid from $5 to $10 per day to the man. The pay, when first struck, was found on bedrock but gradually rose higher and turned into the hillside, where it has been followed on a much higher level, again on bedrock. The following claims were also taken up, beginning below the Booths' property and running down stream, viz.:—*Larkin's* claim, which paid 1 oz. per day to the man; the Siwash company's claims, which paid a little more than 1 oz. per day to the man, and the *Dave French*, *Heppenstal*, and *Pete Irvine*, all of which paid an average of 1 oz. per day to the man. Above the Booth claims the creek did not yield anything, as the pay had turned into the hillside."

The discovery of these placer claims doubtless led to the prospecting of the country for lode deposits and to the staking and recording of the claims about to be described.

The properties referred to lie in a mineralised area, immediately adjacent to the Hudson Bay Post at Kitsilas canyon and may be all reached from this point, which is their base of supplies, by passible, though not always very good, trails.

Trails.

From the H. B. Co. warehouse as a centre, the various claims lie as follows:—

Golden Crown and *Granite claims.*—1½ miles in a south-easterly direction.

Golden Eagle Group.—1½ miles due east from the river.

Ptarmigan Group.—5 miles to the north-east and up a very steep trail.

Emma Group.—3 miles by trail to the north-west, along the bank of the river.

Tandem.—3 miles to *Emma*, from whence 3 miles to north, to the south bank of Chimdemash creek, (On this creek placer gold was found, paying $3 per day to the man, working with rockers, heavy colours being obtained, probably derived from leads in the neighbourhood).

Geology.

The properties so far developed are all located on quartz veins, occurring in what appears to be an igneous or highly altered sedimentary rock, and a cursory examination seems to indicate that in this vicinity lies the contact between the igneous rocks of the Coast range and the sedimentaries, which are distinctly seen further up the river.

Ptarmigan Group.

This group consists of eight claims, the *Ptarmigan*, *Ptarmigan No. 2*, *Arden*, *Blue Grouse*, *Fedora*, *Emerald*, *LaTosca*, *Missouri*, *Tandem Fraction* and *Transit*, and is owned by Howard Gould, represented by S. A. Singlehurst.

The group is situated practically on the summit of Bornite mountain, at an altitude of 4,700 feet above Skeena river, and 5 miles in a north-easterly direction from Kitsilas canyon.

Bornite mountain does not come to an abrupt summit but presents a considerable area of flat or gently-rounded surface, entirely free from timber. The mine buildings are situated a few hundred feet lower down, on the edge of the timber line.

From the steamboat landing to the base of the mountain, a distance of some 2½ miles, the Government have built a very good road on an easy grade, and from this point a zig-zag trail rises abruptly up the mountain side until the elevation of the claims is reached.

The principal work has been done on the *Ptarmigan*, a series of open cuts having exposed for some distance a quartz vein in a diabasic rock matter. The strike of the vein is north and south, with a dip of 75° to the east. On the principal surface showing a vertical shaft has been sunk, which, at the time of my visit, had attained a depth of 130 feet. The vein follows the shaft down for some 30 feet, at which point the former dips off to the east, the shaft continuing vertically down through the country rock and the vein being reached by cross-cuts from the shaft at the 60 and 100-foot levels. It was stated by the manager that when the shaft was down 150 feet another cross-cut would be run to cut the lead.

The vein has been developed by the following drifts, following on it from the shaft or ends of the cross-cuts mentioned:—At 30′ depth, drifts 20 feet north and 25 feet south; at 60′ depth, drift 16 feet to south; at 100′ depth, drifts to north and south, having a total length of 60 feet.

Besides the under-ground workings there are a number of surface cuts, etc. The underground workings disclose a well-defined and banded quartz vein, generally breaking freely from the walls. The vein varies considerably in width but may be approximated at from 2 to 4 feet.

The quartz is mineralised with galena, bornite, copper pyrites, and unquestionably in parts carries very high values in silver, probably occurring as sulphides. Average assays from some of these richer parts are reported by the management to run as high as 0.95 oz. gold, 200 oz. silver and 3.5 copper.

The average values could only be obtained by very extensive sampling, which circumstances did not admit of. The property is a concentrating proposition, and it is probable that the method of treatment adopted will be a concentration to be effected at some point between the mine and river, where water-power can be obtained, and the shipping of such concentrates to the smelter. The property is so situated as to render the operation of an aerial tramway to the river easily feasible.

Emma Mineral Claim.

This is a full claim owned by C. W. D. Clifford *et al.* The property is situated a few hundred yards from the east bank of the Skeena river and 3 miles above Kitsilas canyon. A tunnel has been driven in the hillside 174 feet on a quartz vein having an easterly strike and dipping about 45° to the north. For 66 feet in the tunnel is closely timbered and prevents a good view of the vein, but from this point there is an irregular but well-defined quartz vein with a considerable number of stringers, which, a few feet further in, join into one strong vein, having a probable width of 7 or 8 feet on the north side of the tunnel but pinching a little on the south; the floor of the tunnel is in ore, however, and the vein may have a greater width than noted. Across the face of the drive there is a 15-inch quartz vein dipping 45° north, but this is probably a stringer, as quartz is seen along the floor of the tunnel, on the north side, apparently leading to the larger vein seen further back from the face, the main vein at this point dipping below the floor of the tunnel to the east as well as to the north. The main vein is well-defined, of banded structure and breaking easily from the walls, which are a fine-grained porphyrite. The vein matter is fairly well mineralised with copper pyrites and bornite, and I am informed carries free gold. The ore could be easily concentrated and the concentrates shipped by steamer, which at present passes a few hundred yards from the property.

I. X. L. Mineral Claim.

This property, owned by C. W. D. Clifford *et al*, is an extension of the *Emma* claim, and is situated about 400 feet further up the mountain. A few shots have exposed a strong quartz outcrop, having a probable strike of N. 60° W., with a dip of about 60 to the south. The vein is about 8 feet wide and apparently well defined, the walls being a fine-grained porphyrite. The vein matter is well mineralised with bornite and copper pyrites, and the surface showings would indicate that the property is well worth further development work.

Boot Jack Mineral Claim.

This claim, owned by C. W. D. Clifford *et al.*, is an extension of the *I. X. L.* and is situated further up the mountain, which rises rapidly. The property was not visited, as I was informed that the surface showings indicate a continuation of the *I. X. L.* vein, but that very little work had been done.

The three claims just mentioned have been surveyed this fall as a *Group* and Crown grants applied for.

Monte Christo Mineral Claim.

This claim, owned by Louis Anderson, is situated about three miles from the Skeena river at Kitsilas canyon, and at an altitude above the river of 900 feet. An open cut has been made in the side-hill, exposing a few mineralised quartz stringers or segregations, the quartz being fairly well mineralised with copper pyrites. These stringers occur in a green sericite schist showing a cooling fracture on the north side, the approximate strike being N. 60° W. There are no evidences of a contact deposit or a fissure vein, and at present there are not sufficient values to make it a paying property.

The following properties I was, through lack of time, unable to visit personally and am indebted for the description to miners who have worked on the claims.

Toulon Mineral Claim.

This claim, owned by M. C. Kendall, of Seattle, is situated about six miles above Kitsilas canyon and 2½ miles back from the Skeena river, on the east bank. The altitude is 900 feet above the river. An open cut and tunnel of 40 feet have been driven on a quartz vein having a width of six feet, and occurring in an igneous rock. The vein matter is mineralised with bornite and copper pyrites, and the bornite carries silver values and a little free gold. The total assay values are reported as $30 per ton.

The *Golden Crown* mineral claim is situated on Gold creek, two miles below the canyon of the Skeena and about one mile up Gold creek from the main river, at an altitude of 250 feet. Several open cuts have exposed a quartz vein 100 feet wide, and reported to carry values in free gold. The property is now under bond. The owner is Louis Anderson.

Golden Eagle Mineral Claim.

This claim, having the same owner as the last mentioned, is situated on Gold creek, adjacent to the *Golden Crown.* A quartz lead was located on the property in the spring of 1901, the vein, from which good gold values are reported, having a width of about four feet. Some $20 per ton is stated to be the average of the assays. The quartz, when crushed, gave colours of free gold, and the values are claimed to be free milling.

Office Statistics—Skeena River Mining Division.

Number of free miners' certificates	120
" mining claims recorded	214
" certificates of work	200
" conveyances	72
" abandonments	3

Revenue Collected.

Free miners' certificates	$ 638 00
Other mining sources	1,445 25
Total	$2,083 25

QUEEN CHARLOTTE ISLANDS.

Report of H. Carmichael, Provincial Assayer.

Under instructions, I proceeded to Queen Charlotte islands to examine a deposit of asphaltum, said to have been discovered on Ramsay island, and beg to submit the following as a result of such examination:—

Routes.

The Queen Charlotte islands have not been much visited in the past, and consequently little is generally known about them, but as it seems probable that in the near future they will receive considerable attention from the prospector, the following notes as to routes of travel, tides, anchorages, inlets, etc., may be found useful.

The C. P. N. Co.'s steamer leaves Victoria and Vancouver once each month for Skidegate, Queen Charlotte islands, calling on the way at Essington, at the mouth of the Skeena river. This is, of course, the easiest and best method of reaching Skidegate, but as these boats only run once a month, and as it is quite easy to miss the steamer at Essington (as did the writer), it may be well to give an alternate route.

At Essington, then, I obtained an open sail boat, such as is used by the Columbia river salmon fishermen, together with an Indian crew of two men, and from here we made the head of Banks island without any trouble, finding an excellent harbour for small boats, not shown on the chart, as the detail of the coast line is entirely unsurveyed and to this extent is quite unreliable.

Banks island, as are the others of this group, is low-lying and cannot be seen from the Queen Charlotte shore, although on a clear day the high peaks forming the backbone of the Queen Charlotte group, are distinctly visible from here. Although these peaks may be visible they are liable to be suddenly obscured, so that in crossing Hecate sound it is highly advisable to note carefully the compass-bearing of the course from the point of departure.

If the wind should be unfavourable for a direct run from here to Skidegate the Indians usually make for Bonilla island, situated some 9 miles S. S. E. from the head of Banks island, and about 4 miles off its south-west coast line.

Bonilla island forms an excellent landmark in crossing from Queen Charlotte, as it rises in a dome-shaped cone to a height of 550 feet above the sea. There is reported to be an anchorage for small boats off the south end of this island, but it is not to be recommended for any lengthy stay, unless the boat is small enough to be hauled above high water in case of necessity.

The distance from the head of Banks island to Skidegate is about 70 miles, which, with a fair wind and a good boat, can easily be covered in a day. It is, however, inadvisable to attempt it in a small boat should the weather be threatening or the barometer falling, as Hecate strait is comparatively shallow and with the wind against the tide a very nasty sea gets up in a very short time, as the writer has good reason to remember.

The only permanent settlements on the Queen Charlotte islands are at Masset, at the extreme northerly end, and at Skidegate on Skidegate inlet. Skidegate forms the most central starting point for prospecting parties, as from here they can proceed north or south along the east coast, or through Skidegate inlet to the west coast of the island. There are here two stores, from which can be obtained the more ordinary supplies required by prospectors.

Arriving at Skidegate on 1st October, the writer discharged the sail boat and crew that had brought him over from Essington, and, obtaining a canoe with native Indians (Haidas), proceeded southward to Gumshewa inlet (Cumshewa on the chart). This is the only stretch of open sea which must of necessity be crossed in a visit to the southern islands of the Queen Charlotte group, as the rest of the trip can be made in comparatively quiet and sheltered waters, navigable in a canoe even though the sea outside be rough.

The only place between Skidegate and Gumshewa inlets where a canoe could put in for safety in the event of bad weather is at Skidegate Chuck, located about half way between the two inlets. A very strong ebb tide sets past Spit point (the Illcoon of the Indians) and it should be avoided at such times. In fact it might be noted that a thorough knowledge and study of the tides is almost essential to safe navigation in a small boat along the coast of Queen Charlotte islands, and parties going there are advised to take cognisance of this.

Gumshewa and Selwyn inlets are, at high tide, united at their heads by narrow strips of water connecting the small intervening lake with either inlet. These passages are dry at low water but flood tide fills the lake from either side, and just before extreme high tide there is a continuous current flowing southward into Selwyn inlet, which differs in this respect from the other inlets in which the tide flows northward. At high tide a depth of eight feet of water can be counted on in these passages, which are called, by the Indians, Kaatsus, while the intervening lake is termed Sook-i-tillicum. At the head of Gumshewa inlet is a prominent peak called Kihita by the Indians, which can be seen for a long distance out at sea.

SKEENA RIVER, BELOW CANYON.

COPPER RIVER, FLOWING INTO SKEENA RIVER.

An arm of Selwyn inlet extends for several miles south-westerly, at the head of which a river—navigable for small canoes—flows in from two lakes, and from the head of the farthest of these two lakes the Indians say there is a very short trail to Mitchell or Gold harbour, on the west coast of the island.

In going south past Lyell island to Darwin sound, a convenient stopping place for small boats will be found at the old deserted Indian village of Tanoo, on Tanoo island. The passage outside of Lyell island should not be attempted in bad or threatening weather, as the strong tides running past the points set up a sea much dreaded by the Indians. It is here noted that on the charts the north-east point of Lyell island is incorrectly marked and is shown two miles too far to north-east.

Going south there is absolutely no shelter until Atli point has been well rounded, when there is a small bay, not marked on the chart but called by the Indians Sclea, which, while sheltered, is only suitable for small boats, as it goes dry at low tide. There are also several rocks near the entrance which require to be avoided.

To House island from Sclea bay is an easy sail. The bay at the west end of this island affords good anchorage for boats not drawing more than about 10 feet, while on shore there is a very fair camping ground.

On the south and east shores of Ramsay island there is absolutely no shelter; there is a small bay on the north end, but the anchorage at House island, just opposite, is much to be preferred. This was the most southerly point visited on the trip.

Geology.

From such superficial observation as was possible in a hurried trip it would appear that in those islands lying south of Skidegate, and more particularly south of Lyell island, the geological conditions are somewhat similar to those of Vancouver and adjacent islands, in which promising copper properties have already been developed, and it would seem as though the region referred to was well worthy the attention of the prospector. As a matter of fact a group of claims has already been located on Skincuttle inlet by a party of experienced prospectors and miners. Samples of copper ore from here have been brought out and indicate the probability of this property developing into a valuable copper-gold mine.

Hot Spring.

In the neighbourhood of Hot Spring island—say within a radius of 5 miles—the rock formation appears to differ somewhat from the rest of the surrounding country, and consists chiefly of coarse agglomerates and breccia with stratified ash beds occurring at different points. The agglomerates seem to be composed of the older argillites and sandstones, which have been invaded and enclosed by the later volcanic rocks; these are again cut by quartz veins varying in thickness from the smallest stringer up to several inches.

In the region adjacent to the hot spring, from which the island takes its name, these quartz fissures were observed to be much more numerous, and it is probable that they are continuously being formed by the deposition of silica from the hot subterranean waters as they are cooled in rising to the surface. The hot spring mentioned, and which seems to be the centre of this action, is situated on the west shore of a small island, of but a few acres in extent, known as Hot Spring island, lying midway between Ramsay and Murchison islands. The spring in question issues by a number of fissures from the agglomerate rocks in such a way as to render it difficult to estimate its flow, but it may be set down at about two cubic feet per minute. The temperature of the water as it issues from the rocks was found to be 72° Centigrade or 162° Fahrenheit.

The following is a partial analysis of a sample of the water obtained for the purpose:—

Total solids	313	grains per gallon.
Chlorides	129.5	〃 〃
Sulphates (calculated as sulphur)	5.5	〃 〃
Sulphides	traces.	
Silica	0.015	〃 〃
Calcium	traces.	
Potash	none.	
Salts of heavy metals	none.	

Asphaltum.

To return to the asphaltum, the reported discovery of which was the primary reason for this trip, it was noted as occurring issuing from agglomerate rocks on the northern and eastern shores of Ramsay island, on House island, Agglomerate island, and on the outlying Tar islands, and in all the places noted and examined its occurrence was under identically similar conditions. The south-western shore of Ramsay island was examined, but no sign of asphalt was here observed, the rock formation here being different and composed largely of massive bluffs of porphyrite and andesite, without any of the agglomerate beds.

In the agglomerate rocks already referred to in connection with the hot spring, there are a number of small seams or fissures through which was slowly oozing a dark tar-like substance that, upon subsequent examination in the Laboratory, proved to have the characteristics of petrolene, but of rather a higher specific gravity and might be generally classed as closely allied to the asphalts. In many instances this substance was observed as apparently issuing through the same seams as were occupied by the quartz stringers already noted, and it would appear as though both had a common cause of origin. In places this "mineral tar," as it is locally called, had collected in small pools, but at no point observed did it occur in sufficient quantity to be of any present commercial value, but served rather as an indication of the possibility of a deep-lying deposit, which might be developed by boring. As to the probable success of such an enterprise it would be impossible to form any very accurate opinion, without an extended and careful study of the geological conditions and the finding of an explanation for the occurrence of tar in a volcanic rock.

It will be remembered that the asphaltum group of minerals are produced by the resinification or oxidation of the petroleum group, so it is possible that a sufficiently deep bore-hole might disclose not only bitumen but also petroleum oil.

The occurrence of bitumen in the formation before mentioned might be accounted for in two ways. First, that the area now occupied by volcanic rock was originally covered by rocks of the cretaceous series, now represented by the breccias and agglomerates enclosing fragments of these older rocks, viz., argillites and sandstones. These cretaceous rocks would contain the carbonaceous matter from which the petroleum might be distilled by downward distillation, when the rocks were invaded and covered by the vast volcanic overflow which undoubtedly took place. These petroleums may be slowly rising again and, becoming oxidised in the process, are forming the bitumens which are seen.

Secondly, the petroleums may be derived from the distillation of hydro-carbons contained in the deep-seated rocks of carboniferous age which the late Dr. Dawson argues, from analogy with certain portions of Vancouver Island, may underlie rocks of Triassic series in Queen Charlotte islands.

The circumstances under which this outcrop of tar is found present some points of analogy with the occurrence of asphaltum and petroleum in California.

The two points principally to be noted are the existence of thermal springs and the deposition of silica due to hydro-thermal action, and in reference to this, one cannot do better than quote Mr. A. S. Cooper, the State Mineralogist of California, in his monograph on this subject.

"Through its inferior gravity, petroleum oil ascends through water from the depths of the earth, and either forms bitumenous springs upon the surface of the earth, or, by its buoyancy, floats upon the water and is stored in the upper parts of porous or seamed strata. The movement of subterranean water is indicative of the movement of oil. Besides these offices, the influence which thermal waters, holding silica and other minerals in solution, have exerted in many rocks is a question closely connected with the accumulation of bitumens. All deposits precipitated from water—lime, silica, etc.—may become the cementing substance of shale or sandstone; and, again, all substances cementing or composing rocks which are soluble in water are liable to be leached from the rocks by percolating water. There may be mineral springs without the presence of bitumen, but there are no springs of bitumen that are not accompanied by mineral waters."

SOUTH-EAST KOOTENAY DISTRICT.

FORT STEELE MINING DIVISION.

REPORT BY J. F. ARMSTRONG, GOLD COMMISSIONER.

I have the honour to report as follows, on the progress made in mining in this division during the year ending December 31st, 1901.

The following table shows that there are 1,232 mineral claims in this division, 135 of which are Crown granted, or held under certificates of improvements, 642 under certificates of work, and 455 on which work has not yet been recorded. In the following division I have, as in former years, taken the Kootenay river as a dividing line and subdivided each side into three sections.

Sections.	Held under Crown grant or Certificate of Improvements.	Certificate of Work.	New Locations.	Total.
North-east	....	12	1	13
East Centre	24	163	139	326
South-east	4	35	31	70
South-west	26	127	105	258
West Centre	81	274	168	523
North-west	....	31	11	42
Total for 1901	135	642	455	1,232
Total for 1900	105	704	470	1,279
Total for 1899	68	718	729	1,515

The following information has been collected by Mr. L. W. Patmore, Mining Recorder:—

NORTH-EAST SECTION.

This section is comparatively unimportant, there being but 13 claims in existence, although there is an enormous area of unprospected country. With the exception of the *John Bull* and *Carbonate Groups*, upon which considerable work has been done, no development is to be noted.

EAST CENTRAL SECTION.

This section includes the drainage area of all streams emptying into the Kootenay river, between and inclusive of Lewis creek and Bull river.

On Lewis and Diorite creeks, 13 certificates of work have been granted, and 5 new locations made.

On Tracy and Grundy creeks, 20 certificates of work and 9 new locations have been recorded.

I am informed of the following development work on the *Estella Group* of claims, which is situated on Tracy creek, and is one of the oldest and most developed properties in this division. The work of the year consists of some 400 feet of cross-cuts and tunnels. This makes the total development on the property to consist of a shaft on the ledge, 700 feet in length; one tunnel 750 feet in length, and another of 150 feet. Contracts have been made for the construction of 500 feet of tunnel.

On Wild Horse creek and its tributaries, 60 certificates of work, 29 new locations, and 4 certificates of improvements have been recorded. The development work on this creek for the present year consists chiefly of placer mining by Chinamen. The properties of the Invicta Gold Mines, Limited, and the *Nip and Tuck* Crown-granted placer claims, have been leased by Chinamen and have yielded considerable gold. A Chinese company—The Quong Yung Tong Co.—has also been operating claims on this creek, but without much success.

Little more than the annual work of representation has been done on the quartz claims of this creek.

On Maus creek, 6 certificates of work and 4 new locations have been recorded.

On Lost, Horseshoe and Dibble creeks, 15 new locations and 2 certificates of work have been recorded.

On Bull river and its tributaries, 51 certificates of work and 5 certificates of improvements have been issued, and 65 new locations made, the greater number of which are on, and in the vicinity of, Fenwick mountain, and are now known as the *Bull River Iron Mines*. (*See* page 1007.) Considerable prospect work in the nature of surface-cuts and short tunnels has been done on these claims, for the purpose of discovering the trend of the ore bodies. The result of this preparatory work is, I understand, satisfactory, placing the property in such a position that a diamond drill may be employed to great advantage. The ore is a high-grade, red hematite, carrying sulphur and phosphorus in quantities too small to be considered. The outcrop shows a large number of parallel leads of clean hematite ore, varying in width from 1 to 10 feet and occurring in a mineralised zone from 50 to 200 feet wide.

Considerable development work has been done during the present year on the *Star Group* of claims, which is situated on Quartz creek, a branch of Bull river.

South-East Section.

In the vicinity of Sand and Rock creeks twenty-one certificates of work and seven new locations have been recorded. On Sheep mountain, and in the vicinity of Elk river, fourteen certificates of work and twenty-four new locations have been recorded.

Michael Phillipps, of Tobacco Plains, informs me of development work in this section as follows:—

The *Georgia*, *Copper Giant*, *Montana* and *Belle Vue* claims, situated on Phillipps creek, are on a lead which can be traced for miles along the mountain side. The ore is a rich sulphide of copper with much black oxide, and lies between syenite and porphyry walls. The work for this year consists of:—*Georgia*, shaft continued 10 feet; *Copper Giant*, 12 feet of shaft; *Montana*, 50 feet of tunnel, and *Belle Vue*, shaft continued to a depth of 50 feet.

On the *Wetmore*, situated on Little Copper mountain, 17 feet of tunnelling have been done. This ore is much the same as that above mentioned, but carries more gold values with iron sulphides.

South-West Section.

In the vicinity of the Lower Moyie lakes 74 new locations have been made, and 66 certificates of work recorded. I am informed of the following development work in this section:—

St. Eugene Group, on St. Eugene mountain, 2,700 feet of tunnelling and 270 feet of shafting and stoping; cost, $35,000.

Society Girl Group, cross-cut tunnel, 250 feet; shaft, 50 feet.

Dixy Group, some hundreds of feet of open cuts made in searching for ore body.

Aurora Group, on the west side of Lower Moyie lake; tunnel, 175 feet; shaft, 35 feet.

In the vicinity of Palmer's bar and the Upper Moyie, 61 certificates of work, 3 certificates of improvements and 31 new locations have been recorded. I understand that considerable work has been done on the *Pekin Group* of claims, but I have not received any details of the operations in this vicinity.

WEST CENTRAL SECTION.

In the vicinity of Cranbrook and Mount Baker 34 new locations have been made, and 14 certificates of work recorded.

On the St. Mary's river and its tributaries, 134 new locations, 260 certificates of work and 16 certificates of improvement have been recorded.

I have been informed of the following development work:—

North Star Group, 2,700 feet of drift, shafts and raises; *Daffodil Fraction*, 100 feet of tunnel; *Emerald Fraction*, 25 feet of tunnel; *Stonewall Jackson*, 35 feet of tunnel; *Quantrell*, 37 feet of tunnel; *Dean*, 27 feet of shaft, and 20 feet of tunnel. *Sullivan Group*, on Sullivan hill, 90 feet of tunnelling; *Jew Fraction*, 110 feet of tunnelling; *Hidden Hand*, 20 feet of tunnelling.

On Perry creek considerable development work, consisting of some 550 feet of tunnelling, has been done on the properties of the Kootenay (Perry creek) Gold Mines, Limited. Considerable placer mining is also in progress on this creek, owing to the fact that Messrs. Thomson, Banks Bros., and Thies, after sinking a shaft and drifting, have encountered "pay dirt," and have taken out a considerable amount of gold. Other leases, of which there are nearly a dozen, are now being worked.

The following development work on Alki creek has been reported:—

Hardscrabble, 80 feet of tunnel and 20 feet of shaft; *Emerald*, 10 feet of shaft; *Alice*, 10 feet of shaft.

One of the owners of the *Faller Group*, on White Fish creek, has sent me the following information respecting this property:—

This group consists of six mineral claims, the *Faller*, *Evangeline*, *Lamont*, *Standard*, *Estella* and *Alice*. On the *Faller* two tunnels have been driven, the No. 1 for 405 feet, 275 feet of which were through gravel, the remaining 130 feet being on the ledge, while the No. 2 tunnel is now in for 74 feet, being in ore the entire length. The ledge is 8 feet in width; the ore is copper pyrites with some native copper; the values are as follows:—Copper, 3 per cent. to 26 per cent.; silver, 6 oz. per ton; gold, from 80 cents to $2.50 per ton. On the *Evangeline* a shaft 60 feet deep has been sunk on the ledge, and is in ore all the way. Other work, in the nature of surface cuts, has proven the width of the ledge to vary from 3 to 10 feet.

I have also received information of the following development work in this section:—

WEST FORK OF ST. MARY'S RIVER.

The *Great Dane Group* (Morris creek), 200 feet of tunnelling.

The *Princess Group* (Bull Dog mountain), shaft, 75 feet.

The *Bracebridge Group*, 6 claims surveyed.

Welcome Group, part surveyed.

Black Currant Creek.

The *Klondike Group;* shaft, 60 feet. The *Bulah Fraction;* tunnel, 25 feet. The *Dandy Group;* tunnelling, 100 feet.

On this creek, and also on White Grouse mountain, there are a large number of claims, which, though situated in this Mining Division, are recorded in West Kootenay.

On the *John Bull Group*, 60 feet of tunnel, and on the *Good Hope*, 50 feet of tunnel and cross-cut have been run.

North-west Section.

This section comprises the drainage area of Cherry and Skookumchuck creek. Owing to the distance from transportation, but little development work has been done during the year. Thirty-one certificates of work and 11 new locations have been recorded.

I am informed that work on the *Carbonate King* mineral claim now consists of 300 feet of tunnel, on the *War Eagle Group* of 40 feet of tunnel and 12 of open cut, and on the *Mother Lode* and *Copper King* of 50 feet of tunnel,

Iron.

Note by Provincial Mineralogist.—During the past season there have been numerous reported discoveries of hematite iron ore in the vicinity of Bull river. It has been impossible to visit these personally, but as they had been examined by Mr. Wm. Blakemore, M. E., who is at present working the iron deposits near Kitchener, Goat River Mining Division, his notes have been obtained and are given below. The locations examined, some 20 in number, lie on the summit of a range of hills to the east of Bull river, above the "old pack bridge," noted in the Report of 1896.

Notes on Iron Ore deposits, Bull River, East Kootenay, B. C.

By Wm. Blakemore, M. E.

Bull river flows into Kootenay river at a point about two miles north of the town of Wardner. There is a good waggon road from Wardner for a distance of six or seven miles along the west bank of the former stream, to the *Chicamun Stone* copper mine. From this point northwards there is only a trail. Crossing the river to the east bank, opposite the *Chicamun Stone*, by means of the old pack bridge, I commenced the ascent of the mountain, which has an elevation of 6,000 feet above sea level, the elevation at the level of the river being approximately 2,000 feet. The distance from the pack bridge to the summit by measurement is two and one-half miles. The base of this mountain is Cambrian, but nearer the summit and on the other side, sloping to the east, magnesian limestone occurs. The cap, which is fractured and exposed in a series of rugged cliffs, consists mainly of sandstone shales of the Upper Cretaceous formation. On the cap of the mountain are numerous narrow stringers of good hematite ore; these stringers, however, are irregular as to continuance and the widest I measured was 22 inches. In this latter a hole was drilled and the iron blasted, one shot uncovering inferior ore mixed with lime.

Standing on the summit and looking to the north-east there is a precipitous descent into a creek, which is shown upon all maps of this section as Iron creek, and is referred to in the late Dr. G. M. Dawson's report. The whole side of the mountain here is precipitous and rugged, but although I carefully examined the exposures I found no evidence of iron in workable quantities. Looking to the north, up Bull river, one sees a great series of rugged limestone peaks, the whole country presenting evidence of violent convulsion, and suggesting the impression of no regular deposit. At many points within the range of vision small quantities of hematite have been found during the past season. I have assayed excellent samples from Iron creek, Fenwick creek and from a point on Bull river, about five miles north of that which I am now describing. I append actual analyses of several samples, together with a series of analyses of the samples taken from Messrs. Frank and Gebo's bonded claims, on the deposit first referred to. From this I think the opinion expressed by Dr. Dawson will be indorsed, an opinion which I certainly, after four years' experience in this section, believe to be the true one, namely, that there are numerous small deposits of good hematite ore on Bull river and its tributaries, but that it is doubtful whether any large bodies exist, and whether there is any iron sufficiently free from disturbance to admit of its being profitably worked. You will also notice from the analyses of samples taken from Frank & Gebo's claims how quickly the impurity developed when work was done.

Assays of Iron Ore from Bull River.

	Iron.	Silica.	Sulphur.	Phosphorous.
No. 1	50.05	20.0	.08	.02
" 2	62.8	6.6	.04	Nil.
" 3	50.6	25.0	.03	.01
" 4	50.0	22.7	.18	.02
" 5	61.7	8.8		

Frank & Gebo's samples, Bull River.

" 6	49.0	26.8	Nil.	Nil.
" 7	48.5	28.8	"	.02
" 8	49.8	25.4	"	Trace.
" 9	32.0	28.7	Trace.	"
" 10	22.2	64.7	.02	.01
" 11	57.2	16.7	.02	Nil.
" 12	57.0	15.4	.04	"
" 13	9.0	79.6	.20	.02
" 14	49.4	27.5	.03	Trace.
" 15	38.2	42.5	.05	.02
" 16	45.4	31.5	.03	.01
" 17	8.0	83.8	.07	.01

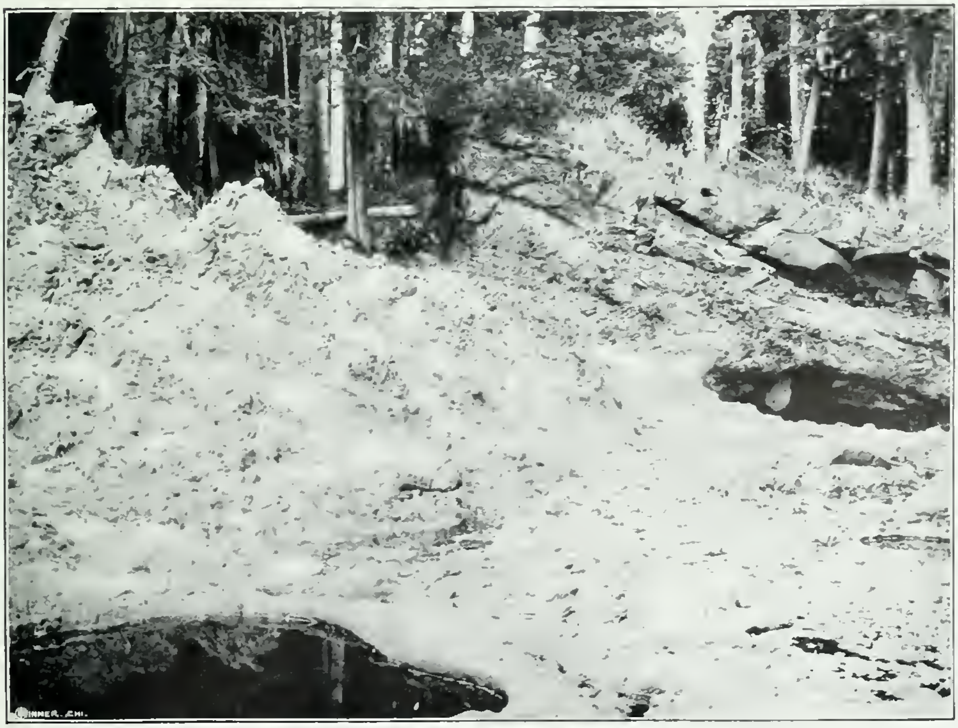
OIL FINDS.

NOTE BY PROVINCIAL MINERALOGIST.—In October of 1901, Mr. R. G. Leckie, M. E., of Vancouver, together Mr. Hugh Baker, having returned from a trip into the south-eastern corner of the Province, reported having made a number of oil locations and brought with them samples of the oil found there.

From 20 to 25 square miles of land, supposed to cover oil-bearing rocks, have been staked by Mr. Leckie and friends, and applications for records, which are as yet under consideration, have been made. Five square miles have been applied for on Starvation creek, immediately north of and adjacent to the International Boundary, and 8 locations have been made on Akamanum or Kishenehn creek, within 5 miles of the Boundary; the remaining locations are on Oil or Sage creek (probably identical with Cameron-Fall creek mentioned by Selwyn), within 10 miles of the Boundary. All these creeks are tributaries of, and flow south-west into, the north fork of the Flathead river, in the south-eastern portion of the Fort Steele Mining Division.

The district in question lies on the western slope of the Rocky Mountains, near the summit, and, while there is a pack trail, much used by the Indians, entering this section from

TAR ISLANDS—QUEEN CHARLOTTE GROUP.



AGGLOMERATE, SHOWING TAR, EAST SIDE RAMSAY ISLAND.

Elko on the C. P. Ry., the party in question reached the locality from Montana, into which State the streams above mentioned flow. There are no authentic maps of the district, such as there are being little better than sketches, no two of which agree, and consequently it is not possible to exactly place the locations made by Mr. Leckie and his associates; there is little doubt, however, that they cover the ground examined by Dr. Selwyn in 1890, and a full account of his trip and the finding of oil by him will be found in the Report of the Geological Survey for 1890, page 11A. A further description of the locality, its geological formations, etc., by Dr. Geo. M. Dawson, will be found in the Geological Survey Report for 1885, page 48B. An extended extract from Dr. Selwyn's Report was published in the Report of this Department for 1896, page 529, so that no further mention need be made here.

It would, therefore, appear, although no new discovery has been made, that the locations mentioned indicate an attempt to actually turn these oil occurrences to use.

The oil samples kindly presented to the Mineral Museum conform very closely to the description given by Dr. Selwyn—"Some of it was of a light lemon yellow colour, but most of it nearly the colour of pale brandy, and with a powerful petroleum odour."

Mr. Leckie notes that the oil from the north spring, which is darker in colour, "comes through the surface soil, carrying a lot of decayed vegetable matter in suspension. The south spring, where we obtained the light yellow oil, is on the river bank in a reddish gravel, and is, consequently, fairly clear."

It is probable that the darker coloured samples are the same as the lighter, except that they are stained from the soil. This supposition is confirmed by the fact that much of the dark colouring matter may be removed by filtering through paper. Samples of the oil have been sent for analysis, but as yet the results of such examination have not been made known.

CROW'S NEST COAL FIELD.

Coal.

NOTE BY PROVINCIAL MINERALOGIST.—The Geological Survey of Canada has had a party in the field during the summers of 1900 and 1901, studying in detail the Crow's Nest coal field, and the results of such investigations are fully set out in the summary reports of the survey for 1900 and 1901.

The following are a few extracts from Mr. McEvay's Report of 1900:—

"The upturned western edge of the Cretaceous rocks form a ridge or escarpment which runs parallel with the Elk river, and 3 or 4 miles distant therefrom. The height of the escarpment is fairly uniform, being 3,500 to 4,000 feet above the river. About half-way up the slope the coal measures are found out-cropping, with dips of 30° to 40° eastward.

"A search for fossils in the limestones underlying the Cretaceous rocks resulted in the discovery of several specimens of the genus *Productus*. These rocks have been classed as Devono-Carboniferous, and for the greater part of their extent such classification must remain. The discovery of *Productus* is, however, fairly good evidence that in this part the upper members of the limestone series are definitely Carboniferous.

"Notwithstanding the great lapse of time between the Carboniferous and Cretaceous deposits, wherever their relation to each other could be seen they appear to be conformable. The general altitude of the Cretaceous rocks is that of a wide, flat-bottomed syncline, or rather basin, for the beds are upturned at the north and south ends of the area, as well as at each side. On the south and west borders of the area, the upturning has been accomplished without much faulting of the coal measures and overlying beds, but the lower members of the series, consisting of the black shales and soft, calcareous shales, have been badly crushed and folded.'

A section of the Cretaceous rocks measured on the Elk river escarpment, about 3 miles north of Morrissey siding, shows some 96 beds measured of a total thickness of 4,736 feet, which includes 24 seams of coal, varying in thickness from 1 to 46 feet, and having a total thickness of 216 feet.

"Of the above thickness of coal the greater part, 198 feet, occurs in a thickness of measures of 1,847 feet. Besides the parts of the coal mentioned in the section as impure, there are some irregular layers of shaly material and nodular iron-stone in the larger seams. Making allowance for these, and deducting some of the smaller seams that could not be profitably mined, say three feet or under, it may be safely concluded that there is a total thickness of workable coal of at least 100 feet.

"Although the extent of the coal lands in the area can as yet be only somewhat roughly estimated, the estimate (230 square miles) should be near enough to the truth to be used as an argument for the calculation of the total available coal supply. The thickness used in the calculation is the minimum already given of 100 feet of workable coal.

"Total area of coal lands.............. 230 square miles = 147,200 acres.
"One acre with 100 feet of coal would yield 153,480 tons of 2,240 lbs.
"50,000 acres would yield............... 7,674,000,000 tons.
"147,200 acres would yield...............22,595,200,000 " "

OFFICE STATISTICS—FORT STEELE MINING DIVISION.

Mineral claims records	455
Placer claims records or re-recorded	20
Partnership placer claims recorded or re-recorded	6
Certificates of work recorded	642
Payments in lieu of assessment work	3
Certificates of improvements recorded	26
Conveyances and other documents of title recorded	145
Partnership agreements recorded	7
Gold Commissioner's permits recorded	5
Documents filed	82
Affidavits filed	928
Record of water grants and permits	6
Mining leases issued	9
Mining leases in force	12
Free Miners' certificates, ordinary	692
" " companies	9
" " special (individuals)	3

Revenue Collected.

Free Miners' certificates	$3,904 50
Mining receipts general	5,393 55
Mineral tax	8,096 84
	$17,394 89

The revenue from the tax on coal and coke and the royalty on coal is unknown to me.

NORTH-EAST KOOTENAY DISTRICT.

REPORT BY J. E. GRIFFITH, GOLD COMMISSIONER.

I have the honour to submit my annual report of mining operations in North-East Kootenay for 1901. In comparing the office statistics for 1901 and 1900 it will be seen that there were fewer records this year, but, on the other hand, the advent of waggon roads has encouraged claim owners to do more development work. as well as to ship ore.

GOLDEN MINING DIVISION.

Apart from assessment work there has not been the usual amount of development going on in this Division; there are, however, some new locations which promise well, notably in the Ice River district, and I am indebted to Mr. O. D. Hoar for information concerning these claims.

Lion Zinc Group. This group is situated on Hustler creek, a tributary of Ice river, and is about 15 miles from Leanchoil station on the Canadian Pacific Railway. This property consists of 5 claims, viz., *Lion*, *Liverpool*, *Manchester*, *London* and *Union Jack*. The vein appears to be a true fissure, about 6 feet wide. The formation consists of an intrusive granite forced through lime and slate, which can be traced for some 5 miles east and west, forming the well-marked valleys of this region, and traversing it at intervals of from 100 to several hundred yards there are igneous dykes, apparently bearing in the same direction. These dykes have doubtless had considerable influence upon the nature of the ore, but to what extent is as yet unknown. The vein is composed largely of quartz carrying iron, zinc and galena. At the present point of operation the vein shows 4 feet of mineral with 22 inches of solid black-jack, assaying 54.62% of zinc with copper, gold and lead. A small shipment was made to Liverpool and proved very satisfactory.

Mica. The following claims were located on a deposit of mica, viz.:—*Black Warrior*, *Black Beauty*, *Black Diamond*, *Black Prince*, *Black Maria*, *Black Pirate*, *Empire* and *Pedley*, from which a shipment of one ton of the average as mined, ranging from dust to 8 by 10-inch crystals, was made to Liverpool, but the returns are not yet to hand.

Shining Beauty Group. This group consists of 5 claims, the *Potato*, *Parsnip*, *Pumpkin*, *Shining Beauty* and *Lillie*. The formation is slate cut by granite dykes. The *Shining Beauty* is located at a contact of granite and limestone, and two veins from 6 to 12 feet wide have been disclosed by open cuts. The larger vein can be traced through the 5 claims and is composed of quartz carrying iron, galena and copper. The claims are located about 14 miles from the C. P. R. track.

Inglewood. This property is situated on Ice river, some 2 miles further up than the *Shining Beauty Group*, and has a good showing of quartz carrying copper values. There are some six veins on this property, varying in width from 8 to 24 inches, showing chalcocite, bornite and cuprite and carrying values in gold. The formation is mainly metamorphic slate, varying in colour from a dark grey to black, and traversed by large dykes of trachyte which cross the veins at an acute angle.

Waterloo Group.

This group, composed of the following claims, viz.:—*Red Mike*, *Prairie Flower*, *Galena Farm*, *Passal* and *Waterloo*, is situated on Moose creek, a tributary of the Beaverfoot. The veins on this property lie in granite and quartz-porphyry, and the surface indications are extensive, an open cut of 20 feet not having yet reached the hanging wall and being in mineralised matter, composed of iron, galena, zinc and copper, all the way.

There are several other claims in this vicinity upon which considerable work has been done but no details are at hand. A good trail was built this summer and a survey made for a waggon road.

Big Bend Mica Claims.

There are about 20 claims located in this mica belt, which is situated at the Big Bend of the Columbia river, the distance from Golden being about 100 miles. The pack trail which starts at Donald is at present in very poor shape, having been allowed to get into disrepair, as there was no travel on it to speak of; in any case, should these claims turn out as anticipated, a heavy outlay would be necessary for adequate transportation facilities. A trail of about 5 miles in length was built this fall from the mouth of Big-Mouth creek, and the owners of the claims referred to brought out 16 packhorses loaded with mica, one sample of which measured 23 by 15 inches. The mica is contained in two veins of well-defined quartz ledges. Some of the claims have already been bonded with a substantial amount paid in cash, and should they, upon inspection, prove to be as represented, work will be proceeded with as early as possible in the spring.

McMURDO CREEK.

In the McMurdo and Bugaboo district no work of any importance has been done during the past season other than the usual assessments, but some of the copper properties in the latter section give good promise and some excellent samples have been brought out.

OFFICE STATISTICS—GOLDEN MINING DIVISION.

	1900.	1901.
Free miners' certificates	216	146
" " substituted	1	1
" " company	4	4
Mineral claims recorded	156	102
Certificates of work	151	98
" improvement	12	2
Conveyances	45	35
Water grants	2	1
Affidavits filed	313	201
Placer leases in force	3	3
Crown grants	9	0
Payments in lieu of work	0	6

WINDERMERE MINING DIVISION.

Toby Creek.

Paradise. This mine shipped 800 tons of ore during the summer to the Trail Smelter, the returns averaging 41 oz. silver and 52 per cent. lead.

The work done up to date comprises:—No. 1 level, 200 feet of incline shaft; intermediate level, 150 feet of cross drifts; No. 2 level, 360 feet, of which 320 were driven on the lead; No. 4 level, 440 feet.

About 20 men will be employed all the winter in development on No. 1 and No. 2 levels. The amount of ore taken out and shipped in doing this work will be, it is calculated, in the neighbourhood of 200 tons.

Kootenay Queen. The work done on this claim this year consists of a 70-foot tunnel, which shows the lead to be well mineralised throughout. It is the intention of the owners to continue work next spring.

Silver Belt Group. This property is situated on Spring creek, adjoining the Paradise. A trial shipment of 15 tons sent to the Trail Smelter netted $1,456, the ore averaging 218 oz. in silver to the ton. Four or five men have been employed all the summer in development work, and there is a showing at the bottom of the shaft of about 12 inches of very good class ore. The property is now working under the name of the Silver Belt Mining Company, Limited.

On the *Silver Tip* the lower tunnel is now in about 130 feet, and is expected to tap the lead in another 100 feet.

On the *Kaslo and Little Jim* an open cut on this claim shows about 4 feet of a well mineralised lead.

On the *Never Sweat* a tunnel of about 50 feet has been driven on the vein and discloses 3 feet of concentrating and 9 inches of clean, high grade ore, from which assays have been obtained as high as 400 oz. in silver, with copper and gold values.

A 40-foot tunnel has been driven on the *Montana*. The ore is a low grade yellow copper carrying $4.80 in gold.

Development work done on the *Leora Group* has proved the ore to be a fairly high-grade copper; the ledge has been uncovered for about 800 feet and in one place shows 3 feet of chalcopyrite, carrying silver values.

Work on the *Mineral King*, which had been idle for some time, was recommenced this summer. The ledge, which is heavily mineralised for about seven feet and in places shows streaks of clean ore, was encountered.

The *Monarch* was bonded to the Richmond Mining Company of New York, under the management of Mr. Alperson, and a good deal of work was done with promising results, but it is understood that the bond was not taken up.

Delphine Group. There has been no work done this summer on this property, but a sleigh road has just been completed to connect the mine with the Toby creek waggon road, and the 80 tons of high grade ore, now in the bins, will be shipped this winter.

The *M. T. Fraction* is on the *Delphine* lead and work has been carried on all the summer and has proven very satisfactory to the bondholders so far. One carload of 17 tons was shipped to the Trail Smelter, and the returns show the gross receipts to be $2,252.29, while the freight from Golden and treatment charges were only $10 per ton. The ore carried 248.3 oz. in silver and 4.9 per cent copper. It is the intention to ship four or five carloads this winter.

The owners of *Black Label No. 1* and *No. 2*, on Mineral creek, have built a trail to their property and have erected cabins, with a view to working all the winter. There is a showing of ten feet of concentrating ore and 16 inches of clean ore, from which latter assays running as high as 260 oz. in silver have been received.

COPPER CREEK.

There are altogether about 25 claims between Copper and Mineral creeks, a number of which have good showings, principally of galena and in some cases of copper ore. A bridge has been erected across Toby creek and trails built, which will facilitate the getting in of supplies and will enable claim-owners to continue development work.

To the west of Copper creek, there are also several promising claims upon which considerable work has been done, with good results.

HORSE THIEF CREEK.

Macdonald Mines. Work has been progressing steadily on this property, formerly known as the *Red Line Group*, about 15 men being continually employed. The Government built twenty miles of waggon road up Horse Thief creek and the company extended this for a distance of eight miles up to the mines. Now that transportation facilities have been afforded it is intended to instal machinery and equipment to facilitate the cheap handling of the ore.

The development work to date on the *Iron Cap* claim of this group consists of :—No. 1 tunnel, 528 feet ; No. 2 tunnel, 197 feet ; No. 3 tunnel, 208 feet ; winze, 62 feet ; No. 4 tunnel, 12 feet ; open cut, 12 feet ; No. 5 tunnel, 126 feet ; winze, 21 feet. Total, 1,166 feet.

Good, comfortable cabins have been built on the property for the accomodation of the employees, as well as blacksmith shops at each tunnel.

The character of the ore on the *Iron Cap* is silver-lead, and as, under the existing conditions of the market, it is not profitably handled, work has, for the present, been closed down, and more attention is being paid to the *Red Line* claim, which is on the other side of the hill. The ore on this latter is a sulphide, carrying copper and silver, and is now being hauled down to the river, a distance of about 29 miles, for shipment to the Trail smelter. This claim will be worked all the winter. The development work consists of :—No. 1 tunnel, 228 feet; upraise, 38 feet ; No. 2 tunnel, 80 feet ; No. 3 tunnel, 235 feet ; total, 581 feet.

Iron Mask. Development work on this claim consists of a tunnel 136 feet long, an 8-foot shaft, and 20 feet of open cuts. The character of the ore is silver-lead, and the development shows this to be a very promising claim.

Juneau Group. This property is situated about 12 miles from the end of the waggon road, on Horse Thief creek. The owners having bonded the group, receiving a substantial cash payment, and work will be proceeded with as soon as possible to thoroughly develop the claims. Judging from the showing of ore on the side-hill, where the rock has crumbled away, it would appear probable that a large body exists under the débris, but the existence of a glacier just above makes it difficult to locate the exact position of the ledge.

Work has been continued steadily on the *Phoenix and World's Fair Group*, it is understood, with good results. Owing to the distance from the base of supplies development work has naturally been costly, but with the advent of a waggon road the cost will be materially reduced for all the claims at the head of the creek.

BOULDER CREEK.

On the *White Cat Group* a tunnel has been driven on the ledge, showing 12 to 18 inches of ore carrying galena and copper.

Maggie and Black Jack. About 40 feet of a tunnel have been driven on the ledge, showing about 2 feet of galena and carbonates.

On Law creek, apart from assessment work, there has not been the activity that the claims warrant, doubtless due to the lack of capital.

DUTCH CREEK.

Only assessment work has been done on the *Nickel Plate* and adjoining claims this year. The former has a showing of 29 inches of ore from which assays have been received running well in gold and copper.

FINDLAY AND SKOOKUMCHUCK CREEKS.

Several new claims, from which favourable reports have been received, have been located on these creeks during the past season ; they are chiefly concentrating propositions.

NO. 2 CREEK.

That portion of the district known as the No. 2 creek section extends from Horse Thief creek to Bugaboo creek. It would appear that a large number of the claims are near to the Salmon river, which seems to be the natural outlet for taking ore to the Columbia river. Up to the present, with one or two exceptions, the amount of work done so far is more in the nature of assessment. Several of the claims, however, are highly spoken of and the samples brought out are very encouraging.

The *Lead Queen Group* comprises five claims. A tunnel has been driven 150 feet on one of these claims, and shows 2 feet of clean ore. The surface indications are good wherever the ledge has been uncovered.

OFFICE STATISTICS—WINDERMERE MINING DIVISION.

	1900.	1901.
Free Miners' certificates	199	156
" special	3	2
Mineral claims recorded	188	121
Certificates of work	285	281
Conveyances	107	67

NORTH-WEST KOOTENAY DISTRICT.

REPORT BY FRED FRASER, GOLD COMMISSIONER.

I have the honour to submit herewith my Annual Report on the progress of mining in the Revelstoke, Illecillewaet, Lardeau and Trout Lake Mining Divisions, for the year ending December 31st, 1901.

While the results have been most encouraging in adding several new shippers to the former list, it is only too apparent that transportation is, and will continue to be, the general drawback to rapid development in this part of British Columbia. Trout Lake Mining Division will, to a considerable extent, find relief in the early completion of the Arrow Lake and Kootenay Railway, now being built from Lardeau; and the "Big Bend" country will derive advantages during the coming season by reason of the new steamer "Revelstoke," built at Nakusp, on Upper Arrow Lake, and liberally subsidised by the Provincial Government and the City of Revelstoke, both of which, I feel assured, will be amply repaid in the increased volume of business done, both mining, lumbering and agricultural.

REVELSTOKE AND ILLECILLEWAET MINING DIVISIONS.

The Mining Recorder's office of the Illecillewaet Division has been closed since September 1st last, hence the returns appear in the Revelstoke Division report.

The *Silver Bell* claim made a trial shipment this year, and the returns appear very encouraging.

Nothing other than development has been done in the Isaac creek camp during the past season, although the *Ogilvie Group* has changed hands and is now under the control of the Cleveland and B. C. Mining Company of Cleveland, Ohio.

In the Jordan Pass section some new discoveries have been made, and considerable development done.

In the "Big Bend" district only the usual amount of development has been done. The Prince Mining Company, however, has been working steadily and has spent in the neighbourhood of $10,000.

Placer Mining.

On Smith creek considerable development has been done on the *Revelstoke*, *Carlisle* and *Blue Jay* placer leases. I am indebted to the Manager of the *Blue Jay* for the following report:—

"We began operations early in March, supplies and men being sent up to the mine, and work underground, which was discontinued last fall, renewed. Beginning at the bottom of the shaft, which is 4 by 6 feet and 90 feet deep, we drifted out into the channel, cross-cutting the same at 60 feet depth. We did not reach bedrock, however, and consequently sunk a blind shaft in the cross-cut, 18 feet deep, where a stratum of pay gravel was encountered and also a small amount of water, but the indications were that we were not in the main pay channel. Being satisfied with the results so far obtained, and fearing that we might encounter more

QUEEN CHARLOTTE ISLAND, LOOKING WEST FROM RAMSAY ISLAND.

water than we could handle by continuing downward, hoisting and pumping machinery not being adequate, we decided to install a complete plant throughout and prepare for the winter operations. Owing to the lack of transportation facilities, we did not begin work on the new plant until the latter end of August, but by the first of November we had everything in readiness, fifteen tons of winter supplies having been packed in from Revelstoke.

"Knowing we could not work the gravels encountered in the blind shaft, we decided to sink the main shaft 35 feet deeper, and again drive into the channel. At the present time we are out about 20 feet, and expect to break through almost any day.

"The results obtained from the explorations of our property have dispelled all doubts as to the richness of the bottom gravel. Very high values have also been found on the bedrock, at a depth of 115 feet, in the *McCarty* mine, which is a few hundred feet distant from our shaft."

Office Statistics—Revelstoke and Illecillewaet Mining Divisions.

Locations	102
Assessment work	102
Payments in lieu of work	3
Conveyances recorded	39
Certificates of Improvements issued	10
Free Miners' Certificates issued	271
Placer Leases granted	9
Placer Transfers	10
Permissions recorded	11
Water Records issued	10

TROUT LAKE MINING DIVISION.

Report by F. C. Campbell, Mining Recorder.

I have the honour to submit herewith my report of the progress of the mining industry in the Trout Lake Mining Division for the year ending 31st December, 1901.

The Division has witnessed, during the past season, steady development of practically all the well-known properties and, at the same time, certain promising discoveries have been made, some of these being in localities hitherto regarded as of but little importance.

I regret that I am unable as yet to report the completion of the Arrowhead and Kootenay Railway, at present under construction from Lardeau, at the north end of Kootenay lake, into this Division, the contractors having been seriously handicapped by the scarcity of railway labourers which has prevailed during the past summer. Substantial progress has, however, been made, the grade being now almost completed to Gerrard, at the south-east end of Trout lake, and steel laid for over half that distance Consequently, I have no hesitation in saying that this portion of the road will be in operation in the coming spring, in fact, a considerable tonnage of ore is already lying at Trout Lake awaiting shipment, and it is probable that a large proportion of the total winter's output will remain at this point until the railway is in a condition to handle it. The completion of this road to Gerrard, whence a steamer runs to all points on Trout lake, should very materially reduce transportation charges, and permit of the shipment, at a profit, of lower grade ores than have hitherto been handled.

A 30-ton capacity "Vulcan Furnace" is at present being erected at Ferguson, and is expected to be ready to treat ores in the course of a few months.

Sunshine, Ltd.

On the *Silver Cup*, which is situated on Silver Cup creek, about eight miles from Ferguson, and owned by the Sunshine, Limited, an English company, 550 feet of development work has been done. This work consisted of drifting and sinking at the 283-foot level. The total amount of ore produced during the year was 386 tons, of which 192 tons (net weight) was shipped. The average value of this ore was $8 in gold, 202 oz. in silver and 33 per cent. lead. The average number of men employed was 14.

On the *Sunshine*, which adjoins the last-mentioned property on the north-west, and is owned by the same company, 25 feet of cross-cutting and drifting was done at the 100-foot level.

Situated in the same vicinity is the *Montana*, on which about 100 feet of tunnel has been driven in a quartz vein impregnated with iron pyrites and galena.

Adjoining the *Silver Cup* on the south-east is the *Free Coinage*, on which 60 feet of work has been done. A small shipment was also made from this property, and is said to have netted about $80 to the ton.

Triune.

Situated a little farther to the south-east again is the *Triune*, owned by Messrs. Ferguson Brothers, of Ferguson. In the upper workings of this property about 50 feet of drifting was done during the year, and 95 tons of ore mined and shipped, the average value per ton of which was $18 gold, 400 oz. silver and 50 per cent lead. A new tunnel has been started 140 feet below the old workings and driven about 300 feet. In this tunnel a large body of ore was encountered, but so far has proved of a lower grade than that found in the upper workings. Under present conditions it is impossible to operate this claim during the winter months, and to obviate this difficulty and extend the working season the commencement of a tunnel at a considerably lower level is under consideration.

On the *Triune Fraction*, which adjoins the *Triune*, a shaft was sunk 10 feet in a quartz vein about three feet wide, carrying galena and carbonates. A cross-cut was also driven for about 60 feet, and will be continued in the early spring until the ledge is encountered.

I. X. L.

Adjoining the last-mentioned property on the north-east is the *I. X. L.*, on which a tunnel was driven on the ledge for a distance of 70 feet. The vein being found considerably broken at the depth of this working, a new tunnel was started about 70 feet lower and driven for about 85 feet, at which point a winze was sunk 12 feet. In these latter workings a chute of ore about 10 inches wide was met with, consisting of galena and iron pyrites, the iron pyrites carrying values of from 4 to 6 oz. of gold per ton.

Cromwell.

On the *Cromwell*, situated at the head of Brown creek, work was continued during part of the summer by the owners, the ore being stoped out from the surface downward, and about 5 tons shipped. The gross value obtained was $116 gold and $12 silver per ton. This ore was of an oxidized character, but unaltered iron pyrites, which also carry good gold values, are now being met with as depth is gained. The vein is about 3 feet wide, occurring in a slate formation and, besides the high grade ore, carries considerable quantities of a lower grade material which, in the future, it should be possible to ship at a profit.

On the *Ottawa*, which is situated on Ottawa creek, and possesses a good surface showing, a cross-cut tunnel has been driven for 45 feet, but the vein has not yet been encountered.

About 30 feet of work was done on the *Saxton*, a claim situated in the same vicinity.

The *American*, situated at the head of Haskins creek, has been acquired by the Mountain Lion Mining and Development Company, Limited, which has driven a cross-cut tunnel 55 feet, intersecting the vein at a depth of about 35 feet from the surface; a drift was then continued on the vein for a distance of 185 feet. The above work has proven the existence of a vein of from 1 to 3 feet wide, carrying galena and carbonates. For the last 70 feet, I am informed, the galena is continuous, and in places reaches a thickness of about 1 foot. The value of this ore is, approximately, $100 per ton, but no shipment has yet been made. Three men are at present employed on the property.

Nettie L.

The *Nettie L.* is situated between the north and south forks of Lardeau creek, about 2 miles from Ferguson, with which it is connected by waggon road. On this property, during the year, 350 feet of tunnelling was done and also about 130 feet of up-raise. The ore shipments amounted to 700 tons, of an average value of 0.16 oz. gold, 121 ozs. silver and 17 % lead. The average number of men employed was 20. This property is owned by the Great Western Mines, Limited, a local company, but I understand that during the year the control passed into the hands of British investors, the management, however, remaining unchanged.

Adjoining the last-mentioned property on the south-east is the *Ajax*, owned by the same company. During the year 200 feet of incline and 50 feet of vertical shaft were sunk, and about 50 feet of tunnel driven. Little ore has as yet been shipped from this property, the above-mentioned work being entirely development.

On the *May Bee*, which adjoins the *Nettie L.* on the north-west and is owned by the Double Eagle Mining and Development Company, Limited, a shaft was sunk 100 feet and 90 feet of tunnel were driven, with, I understand, very promising results.

The *Metropolitan*, situated near the head of the north fork of Lardeau creek, has had considerable work of a prospecting nature performed on it, and also a cross-cut tunnel driven a distance of about 200 feet. Seven tons of ore were shipped which, I believe, netted the owners a little over $100 per ton.

On the *Sunset*, also situated on the north fork of Lardeau creek, a tunnel was driven on the ledge for a distance of about 70 feet, and the cross-cut extended 40 feet. I am informed that concentrating ore was met with in the workings.

Adjoining the above property are the *Comstock* and *Silver Bullion*, owned by the Comstock Gold Mining Company, Limited. On the former claim 50 feet of tunnel were driven on a large vein, of which a width of about 2 feet is mineralised with copper pyrites, carrying, I understand, from $8 to $10 gold and 30 ozs. silver per ton.

On the *Wonderful*, which adjoins the *Sunset* on the south-west, a cross-cut tunnel has been started to cut the vein at considerable depth, and has been driven a little over 100 feet during the year.

On Goat creek numerous claims have been located and a considerable amount of surface work done, with a view to tracing the Fish creek mineral belt. In some cases, I believe, free gold has been met with.

The *Gipsy Group*, situated about ¾ of a mile north-west of Ferguson, has had considerable work of a prospecting nature done on it and is said to yield good gold values.

On the *St. Elmo*, situated on Great Northern mountain, a cross-cut tunnel was driven 130 feet, intersecting the lead. At this point the vein is about 4½ feet wide, consisting of quartz carrying galena and copper pyrites.

The Trout Creek section, about 4 miles from Trout lake, has attracted considerable notice during the season, discoveries of high-grade silver ore having been made on several properties.

The *Kathleen*, situated on the north-west side of the creek, possesses a good surface showing, the lead being in limestone and traceable on the surface for a considerable distance. An incline shaft has been sunk on the ore to a depth of 35 feet, and a short cross-cut tunnel also driven.

South-east of the *Kathleen* and on the other side of the creek is situated the *Ruffled Grouse* claim, which is being developed by the owners with good results. Two tunnels, each about 35 feet long, have been driven on the vein, at a distance of about 50 feet apart. From the lower tunnel a winze was sunk for about 20 feet, and a small amount of drifting done from the bottom. In the course of this work several tons of ore were produced and a shipment made which netted close to $100 per ton.

Horseshoe.

The *Horseshoe*, which adjoins the *Ruffled Grouse* on the north-east, is also reported to be opening up well with development. The work done consists of a series of open cuts, etc., along the strike, which have proved the continuity of the lead for a distance of 500 feet, and an incline shaft sunk on the vein for 35 feet. About 300 feet north-west of the shaft a cross-cut has been driven, which has intersected the vein at a depth of 75 feet. From this cross-cut a drift is now being continued towards the shaft. The vein, as exposed in these workings, consists of quartz carrying galena and grey copper of good grade. Nine men are at present employed on the property, and it is expected that ore shipments will shortly be commenced.

On the *Yamhill*, situated on Abrahamson creek, a drift has been put in 50 feet on a well-defined quartz lead carrying gold and copper values.

On the *Senorita Group*, situated on Canyon creek about $1\frac{1}{2}$ miles from Gerrard, and which possesses an excellent surface showing, 60 feet of tunnel were driven, exposing a chute of ore from 3 to 6 inches wide, carrying $7 gold and 60 ozs. silver to the ton and 35 per cent. of lead. Work is being continued with a small force.

A small shipment was made from the *Linson View*, also on Canyon creek, during the year, the values returned being in the neighbourhood of $160 per ton.

The *Maggie May Group*, situated on Tenderfoot creek, has passed into the hands of the Lardeau Valley Mines, Limited. On the *John L.* claim of this group an adit tunnel has been driven 100 feet on a vein from 3 to 12 feet wide carrying good gold values. Two shorter tunnels have also been put in on the same vein at a lower level. On the *Maggie May* claim a tunnel is being driven to intersect an ore chute seen at the surface. The ore is argentiferous galena of an average value of about $50 per ton.

About 150 feet of work were done on the *Silver Queen* and *Keystone* claims, situated in this vicinity, with very good results.

Note by Provincial Mineralogist.—In January of the present year (1902) the Provincial Mineralogist was informed by Mr. Vernon that he was then leaving for Ferguson with a party of men, for the purpose of installing at that place two "Vulcan Smelters," one of which was already on the way. The smelter referred to appears to consist of a small blast furnace with an air-tight V hopper at the top. The blast is induced by a steam ejector, supplied with steam from a special boiler, which causes a partial vacuum above the furnace charge, making an inward draft through the tuyere holes. Nothing further has been heard of the undertaking nor of its probable success.

Office Statistics—Trout Lake Mining Division.

Free miners' certificates issued to individuals	268
Free miners' certificates issued to companies	4
Mineral claims recorded	379
Placer claims recorded	1
Certificates of work issued	476
Cash paid in lieu of assessment work	9
Certificates of improvements recorded	8
Bills of sale, agreements, &c., recorded	218

LARDEAU MINING DIVISION.

Report by G. Sumner, Mining Recorder.

I have the honour to submit herewith my report of progress in the Lardeau Mining Division for the year 1901.

This report embraces only that portion of the Lardeau Mining Division included in the Fish River camp, from the mouth of Fish river to Boyd creek and its tributaries, the southern part of the Division being at present unimportant as regards mining development.

The finding of rich, free-milling gold quartz ledges on the west side of Fish or Incomappleux rivers in May, 1901, was the cause of extensive prospecting during the past season and the recording of a large number of mineral claims. Some of the veins so far discovered are supposed to be a westerly continuation of the *Eva Group*, which is situated on the east side of Fish river on Lexington mountain. The formation, a mica-schist, is the same and a similar intrusion of porphyry dykes in the vicinity of the veins occurs.

Eva Group.

The most important property in point of development and ore showing is that in possession of the Imperial Development Syndicate, Limited, of Nelson, B. C., consisting of 21 claims, and known as the *Eva Group*. At the time of writing the total amount of development, besides a large amount of surface work, is in excess of 1,600 lineal feet underground. This has exposed large deposits of low grade free-milling ore from 10 to 60 feet wide, which contain chutes of what may be called high-grade ore. The two veins on the *Eva Group* upon which most work has been done, have been opened up for over 1,000 feet in length, showing more or less values at every point. Ten large quartz ledges have been discovered on this property, and each of these yields fair assay values. All the claims have been surveyed, Crown grants obtained for some of them, and application for Crown grants made for the others.

The facilities for cheap mining and milling are excellent. The property can be worked to a depth of 2,000 feet from a tunnel about 3,500 feet long. The company has a water grant of 700 miner's inches on Pool creek, which flows through the lower claims and would furnish ample power for all purposes. Development has been carried on steadily for over a year with an average of 10 men, and I am assured by the management that work will be continued.

Oyster Group.

This property, consisting of the *Oyster*, *Gold Bug*, *Mascotte Fractional*, *Triangle Fractional*, *Criterion* and *Criterion Fractional* mineral claims, is in the immediate vicinity of the *Eva Group*, and like the latter carries free-milling gold ore on all the claims. Some remarkably rich showings are found on the *Criterion*, together with a ledge of galena which increases in width from 18 inches at the surface to 3 feet at 20 feet depth. This vein, I am credibly informed, has been traced for 300 feet throughout the claim. The property is under bond to certain parties for $60,000.

Wide West.

In the same neighbourhood is the *Wide West* mineral claim, owned by an American company. There is a tunnel on this property 355 feet in length, 170 feet of which were driven last summer. The tunnel is laid with steel rails and for ventilation an iron pipe is provided. Owing to the poor condition of the trails, great difficulty was experienced in getting the steel rails and a car to this property. In the tunnel there are two veins exposed, the first 14 inches and the second 5 feet in width, both carrying lead, copper and gold values. Another vein, 12 to 15 feet wide, occurs at the surface, and it is expected the tunnel will reach this at a further distance of 60 or 70 feet.

Iron Dollar Group.

This property consists of three full claims and one fractional, viz.:—*Iron Dollar*, *Little Johnnie*, *Carbonate Hill* and *Gilman Fractional*. The group is situated on Lexington mountain, or, to be more particular, on Mohawk creek, a tributary of Pool creek. The veins or ledges are fissures running N. 20° W. The main vein is 12 feet wide and dips into the mountain side at an angle of 60° from the vertical easterly, and consists of quartz highly impregnated with galena together with iron and copper pyrites. There are also two parallel veins, from four to six feet wide, and giving good values in gold. These are continuations of leads occurring on adjoining properties, from which very good values in gold have lately been obtained. No work has been done on these veins to determine the ore bodies. There is also another vein on the *Carbonate Hill* which gives gold values.

The development consists of surface trenching and two tunnels, one on the *Iron Dollar*, 167 feet in length, and one on the *Carbonate Hill*, 56 feet in length. The former work proves the continuity and richness of the main vein for the full length of the claims, or over 3,000 feet, while in the tunnels there are over six feet of concentrating ore.

The *Beatrice Group* consists of three full claims, situated near the summit of Lexington mountain and four men are engaged in driving a tunnel on the property. There is an abundance of good shipping ore, but the policy of the owners is to keep on with development work until transportation facilities are improved.

Camborne Group.

This group, which is under bond to the Rosenberger Syndicate, of Nelson, B. C., comprises nine claims, viz.: *Gold Finch*, *Morning Star*, *Evening Star*, *Red Fox*, *Ridge*, *Walrus*, *Sea Lion* and *Bonanza*, aggregating a total of 300 acres. They are situated on the west side of Fish river, opposite Lexington mountain, and about three miles from the townsite of Camborne. The showings on this property are of exceptionally large deposits of free milling gold ore. The claims extend for one mile along what has every indication of being a large gold-bearing lode, which appears at some points to have a width of 100 feet, and so far, wherever exposed, carries gold values, some very high, as will be seen by the list of assays attached hereto. The lowest exposed point is at the foot of the mountain, and the lode strikes straight up the hill, the upper showing being about 1,800 feet vertically higher; that is to say, a tunnel started at the lower croppings would gain a vertical depth of 1,800 feet under the upper showing mentioned.

On the uppermost claim (the *Gold Finch*) the croppings are most remarkable as to size and values, one open cut exposing a width of 32 feet of vein matter, carefully taken average samples of which show it to contain by assay $10.60 in gold per ton, while four average samples of another 10 feet gave $23.20, $28.80, $20 and $40 in gold per ton. There are on this claim a series of four parallel veins of solid quartz, from 25 to 50 feet apart, all of which probably conjoin in one large ledge. These veins have been opened up at many different points for several hundred feet, and are shown to carry gold values throughout.

The facilities for cheap mining and milling could not be better. As previously mentioned, tunnel levels can be run on the vein at any desirable point, and a main tunnel from the mill-site at the foot of the hill would, by being driven a distance of 4,000 feet on the lead, gain a vertical depth of 1,800 feet under the uppermost croppings. An excellent water power is appurtenant to the claims, 500 miner's inches having been secured on Menhinick creek, which flows through the property and joins Fish river on the lower claim, and the entire group is covered by a heavy growth of excellent timber.

LIST OF AVERAGE ASSAYS FROM CAMBORNE GROUP.

Gold Finch Claim.

Vein No. 1, 42 feet	$ 4 80
Vein No. 2, from average samples, gave $23.20, $28.80, $20 and $40, average	28 00
Vein No. 3, cut No. 1, 25 feet	15 30
Vein No. 3, cut No. 2, 50 feet	8 40
Vein No. 3, cut No. 3, 4 feet	23 60
Vein No. 3, at discovery post, 4 feet	9 00
Vein No. 4, in creek, 8 feet	6 40
Stringers in vein No. 1, 6 inches	128 00
Iron pyrites, 5 feet	3 20
Large croppings on trail, lower claim :—	
Left side	4 80
Right side	2 40

Gold Finch, Selected Samples.

No. 1	235 20
No. 2	556 80
No. 3	6,593 20

OFFICE STATISTICS—LARDEAU MINING DIVISION.

Free miners' certificates issued	182
Mineral claims recorded	432
Certificates of work issued	276
Conveyances, etc., recorded	239

Revenue Collected.

Free miners' certificates	$1,064 50
Mining receipts general	3,843 70
	$4,908 20

SLOCAN DISTRICT.

REPORT OF E. E. CHIPMAN, GOLD COMMISSIONER.

I herewith submit my report on the Slocan District for the year ending 31st December, 1901.

The low price of lead and silver, and the obstacles which have been put in the way of the treatment of the silver-lead ores, have had a depressing effect on the mining industry in this district during the past year. But while expectations have not been fully realised, yet the progress made in the development of the mines, the construction of buildings for their more convenient and continuous working, the erection of mills for the more economical handling of the ores, and the building of roads, trails and bridges to facilitate conveyance to the smelters are encouraging features in the situation, and the feeling for the future is hopeful.

The total tonnage for the year 1901 for the three Mining Divisions in this District was 31,431 tons, a very slight falling off from the previous year. The gross aggregate value of the output for the year is practically $2,200,000.

The largest tonnage producer in the District was the *Arlington* mine, in the Slocan City Division, which has to its credit 5,283 tons. The next largest producer was the *Slocan Star*, in the Slocan Division, with an output of 4,423 tons, followed by the *Rambler-Cariboo*, in the same Division, with about 3,000. The *Whitewater*, in the Ainsworth Division, had an output of about 2,500 tons. Other properties which produced over 1,000 tons are the *Payne*, 1,500 tons; *Last Chance*, 1,420 tons; *Hewitt*, 1,900 tons; *American Boy*, 1,500 tons, and the *Queen Bess*, 1,140 tons.

The most prosperous portion of the District was undoubtedly the Slocan City Division. This prosperity is largely owing to the character of the ore, which is mostly of a dry nature, and consequently the low price obtainable for lead did not have the same depressing effect on the industry, as in the Slocan Division, where the lead-silver ores predominate. As Mr. Christie, in his report, has gone carefully into the details of the development of the Slocan City Mining Division it is unnecessary for me to refer further to it.

In the Slocan Division, on account of the action of the smelting trust in the United States in refusing to treat, or even take, the silver-lead ores, many of the smaller mines were forced to shut down, and the larger ones were obliged to limit their output to such an extent as to force the conclusion that smelting and refining facilities must be provided in our own Province in order to prevent the complete shutting down of the mines of the District. There have been no new discoveries of any great importance in this Division, except as regards the uncovering of previously unknown bodies of ore in the development of certain of the older claims, some of which, after having been shut down for years, have again resumed operations. Notable among this number is the *Washington.*

Washington.

The *Washington*, which had remained idle since 1897, previous to which date it was an active producer, resumed work last July under the management of Mr. J. L. Retallack, who had secured a lease and option on this property and the adjoining *Slocan Boy*. A force of 10 men has been employed, and several hundred feet of development work have been done with encouraging results. One hundred and twenty-five tons of crude ore, of a good grade, have been shipped, and the mine will very shortly make a further output.

Operations have also been resumed on the *London Hill*, another old property which has been idle for a long time. Major Van Moerkerke has obtained a lease from his other partners, has put up buildings at a cost of $400, and is employing 5 men steadily. He is confident that he will be able to demonstrate the value of the property in the near future.

Silver Glance.

The *Silver Glance* is another old property which was first located in 1892, and is owned by the McPhail Brothers and Ericson and Drs. Rogers and Arthur. Since its location not much more than annual assessment had been done until early in this season, when work was begun by two men, and was continued steadily until December, when the force was increased to 5. Two tunnels have been run on the vein, 75 and 50 feet respectively, and two other cross-cut tunnels have been started to cut the lead at a greater depth. The ore is a black sulphuret, carrying very high values in silver, picked samples assaying 15,000 oz. to the ton. The vein, in its present working, is 4 feet in thickness, and 25 tons of ore, which will average 150 oz., have been shipped without sorting.

Further information regarding the Slocan Mining Division will be found in the report of the Mining Recorder, Mr. A. McInnes.

Notwithstanding the loss of the United States markets, development has been going on very steadily over the entire Slocan District, and assessment work has been well kept up, very few of the claims having been allowed to lapse. Generally the mines are being put in condition to make a steady output when economic conditions become more favourable. In the Mining Divisions of the Slocan District there are altogether about 2,500 mineral claims upon each of which $100 worth of work is being performed each year, in addition to the Crown-granted claims, which number 917.

SLOCAN MINING DIVISION.

Report by Angus McInnes, Mining Recorder.

I have the honour to submit my annual report of mining operations in the Slocan Mining Division for the year ending December 31st, 1901. In doing so I regret to have to state that owing to trouble with the smelting and transportation trusts, in the early part of the year, a great number of the smaller mines were compelled to cease operations so far as shipping their ores was concerned, although most of them kept up development work steadily.

The Slocan Star mine has been one of the largest shippers in this Division during the past year, having an output of about 4,500 tons. This property has been steadily developed, and is now in a position to largely increase its production during the coming year. On an average from 80 to 100 men are employed.

The *Rambler* shipped about 3,000 tons of high-grade ore during the year. Many improvements have been made to the plant, among which is a large concentrating mill, now nearing completion, which will add very much to the value and output of the property, and will give employment to a large number of men.

The *Hewett* has made steady progress and has shipped very nearly 2,000 tons of high grade ore. A great deal of development is being done, and ore is being blocked out.

The *American Boy* has shipped during the year about 1,500 tons of silver-lead ore, and a good force of men is employed.

The *Ivanhoe*, which is under the management of Mr. P. Hickey, has shipped about 1,300 tons. A mill and tramway are in operation, and a large force of men is employed.

The Payne Consolidated Mining Company is now at work putting up a large mill and compressor plant at the mine, and expects to resume its shipments in the spring. The output for the past year was about 1,500 tons, taken out in the course of development.

The *Last Chance* has 1,400 tons to its credit for the year, and the prospects are good.

The *Sunset*, *Sovereign*, *Wonderful*, *Goodenough*, *Miller Creek*, *Reco*, *Noble Five*, *Washington*, *Red Fox*, *Antoine*, *Monitor*, *Corinth*, *Surprise*, *Ajax*, *Soho*, *Emily Edith*, *Alpha*, *Marion*, *Mary Durham*, *Buffalo*, *Sweet Grass* and *Mollie Hughes*, have all made shipments during the year, ranging from 700 tons down to 5 tons, and all are reported to have a good reserve of ore in sight.

The *Capella Group*, situated on Goat mountain, deserves special mention. This property is owned by W. R. Will and N. McNaught, and comprises four claims. Operations were begun about four months ago, under the management of Mr. Will, with an average of five men employed, during which time two cars of ore were shipped, or in other words 40 tons, which yielded a gross value of about $7,000. The ore is of a dry character and is exceedingly rich.

The *Bosun*, managed by Mr. W. H. Sandiford, since resuming operations in the spring, is shipping at the rate of about two cars of ore (40 tons) a week. Development has been carried on with much judgment.

All the properties mentioned in this report, with the exception of one or two, have been operated only a part of the year, and then rather in anticipation of a better market for their product and in order to keep up development work.

There have been a great many good discoveries of dry ore, of a very high grade, made on the headwaters of Wilson creek, and also on the headwaters of Four-Mile creek.

OFFICE STATISTICS—SLOCAN MINING DIVISION.

Certificates of work recorded	590
Transfers, bonds and other documents	223
Locations recorded	160
Free miners' certificates issued	577
Companies' free miners' certificates issued	16
Certificates of improvements recorded	46
Cash paid in lieu of work	$615
Water rights granted	11
Abandonments recorded	4
Mining receipts issued	816

SLOCAN CITY MINING DIVISION.

REPORTED BY H. P. CHRISTIE, MINING RECORDER.

I have the honour to submit my annual report of the mining development, etc., done in this Division during the past year.

Although the office statistics show in some branches a decrease compared with those of the previous year, the actual mining done and general progress of the Division is very satisfactory.

SPRINGER CREEK.

The *Arlington* has employed from 80 to 100 men continuously. Several good and substantial buildings and a small saw-mill have been erected. The amount of ore shipped was 5,280 tons.

The *Speculator*, adjoining the *Arlington* and on the same lead, has undergone steady development and has shipped about 10 tons. The bond on this property was taken up and the mine is now owned by the Ricowalibi Mining Company.

The *Two Friends* shipped 40 tons, but little other work has been done.

The *Black Prince* shipped about 150 tons. This property has been steadily developed and has shown up most favourably, the ore being a "dry silver," which is much in demand.

The *Hampton* shipped 17 tons and a small amount of development was done.

The *Esmeralda*, near the *Exchange*, has had development done sufficient for a Crown grant and has shipped 2 tons.

The *Phœnix* and *Viking* shipped 23 tons. The bond has been taken up on this property and 500 or 600 feet of development done.

The *Bondholder* has been worked under lease off and on during the year. About 30 tons of ore were shipped.

The *Tamarac* has been sold and development steadily carried on by 3 or 4 men. Five tons of ore were shipped.

The *Exchange* has been worked a little—under lease—by 2 men, and 5 tons have been shipped. Some exceedingly good ore was taken from this claim.

The *Ottawa* was worked by the owners for the last three months of the year and some exceptionally rich ore encountered while drifting on the lower level.

On the *Morning Star* 700 feet of tunnelling was done and some good free-milling quartz exposed.

The *Republic Group* has been sold to a company promoted by Mr. Charles Dempster. A waggon road has been surveyed and active development is contemplated shortly.

The *Transfer* is under bond and is undergoing development.

TWELVE-MILE CREEK.

On the *Bachelor* a 200-foot tunnel was driven, while the *Champion* and *Sapphire* have been sold to a company promoted by Mr. Charles Dempster, and development will be started shortly.

The *V and M* was worked for about three months and shipped about 10 tons of ore.

The *Ivy*, *Myrtle* and *Mistletoe* have been steadily developed by the owners and a large ledge, carrying good ore, has been opened up.

TEN-MILE CREEK.

The *Enterprise* has been worked by the Enterprise (B. C.) Mines, Ltd., continuously and nearly 800 tons of ore shipped. A concentrator has recently been erected.

The *Neepawa* is under bond to an English company which is at present developing the property.

On the *Iron Horse* development is being steadily continued.

LEMON CREEK.

The *Chapleau* shipped about 15 tons early in the year. The company owning this property suspended operations in the spring but the mine is being kept in order by two men and is expected to recommence working soon.

On the *Kilo Group* a small force has been at work for the last year on development only. This ore is free-milling and the results are encouraging.

The *Legal*, which adjoins the *Kilo*, is being steadily developed by the owners. The ore is free-milling. The work done in the last twelve months consists of 300 feet of drift tunnel, and it is expected that a mill will be erected in the spring.

On the *Rose*, adjoining the *Legal*, a 60-foot shaft has been sunk. The property looks well and has some exceedingly high-grade ore.

The *Fourth of July* was worked under lease by a few men throughout the year, and shipped 12 tons of ore carrying silver-gold values.

The *Duplex* is being worked, under a lease, with very encouraging results. The surface ore from this claim is considered about the best of its kind in the district.

The *Alberta*, *Tail Holt*, *Howard Fraction*, *Slocan Chief*, *Hoodoo*, *Crusader*, *Independence* and *Hope*, besides others, have done a certain amount of work and many of them are promising properties.

OFFICE STATISTICS—SLOCAN CITY MINING DIVISION.

Certificates of work	520
Crown grants	26
Locations	262
Free Miners' certificates	288
Bills of Sale, etc., recorded	266

AINSWORTH MINING DIVISION.

REPORT OF ALEX. LUCAS, MINING RECORDER.

I beg leave to submit herewith my annual report upon the Ainsworth Mining Division for the year 1901.

The progress made in the district during the past year has, on the whole, been satisfactory and extensive development has been done to prove the value of the different properties.

WHITEWATER CAMP.

Development has been carried on on five groups of claims, viz.: the *Bollinger*, *Fletcher*, *Phœnix*, *Indiana* and *Iron Hand*.

The *Bollinger Group* of four claims is situated at the headwaters of Lyle creek, and is owned by Messrs. Bollinger and Gaebler, of Spokane, Wash. Two men were employed during the year and a considerable amount of work done on a vein carrying values in gold, copper and lead.

The *Fletcher Group*, also on Lyle creek, consists of the *Fletcher*, *Cuba*, *Paisley*, *Whistler*, *Connie No. 2*, *Columbia Fraction* and *Havana* claims. A bond on this group has been taken by the owners of the Whitewater mine. A contract for 80 feet of tunnel has been let and the claims have been surveyed and Crown grants applied for.

The *Phœnix Group* is situated below the *Fletcher Group*, adjoining it on the south and west, and appears to be on the dip of the ledge of the last-mentioned property.

The *Indiana Group*, on Lyle creek, consists of the *Indiana* and *Bear Fraction* claims and is owned by the Indiana Consolidated Mining and Development Company, Limited. The annual assessment work has been done.

On Whitewater mountain the following claims and groups were worked, viz.: *Whitewater*, *Whitewater Deep*, *Corean*, *Hazel*, *Tiger and A. Y.*, *Porcupine*, *Elkhorn*, *Red Rock*, *Mayflower Sure Thing*, *Wellington* and *Sunset*.

The Whitewater Mines, Limited, suspended operations for three months of the year (May, June and July), but resumed work in August, after contracting with the Trail Smelter for the output of the mine. Upwards of 80 men are constantly employed.

The *Whitewater Deep Group* has remained idle during the year with the exception of certain work done on claims not Crown-granted.

The *Wellington Group*, owned by the Kootenay and Columbia Trading and Mining Co., of Ottawa, Ont., has been employing 4 to 6 men steadily throughout the year. Ore is now being rawhided down to Wellington Siding, and shipments will be continued through the winter.

The *Sunset* adjoins the *Wellington* on the east, and has been worked through the lower *Wellington* tunnel by the Gold Fields Syndicate, of Rossland. Several cars of galena ore were shipped, but work has now been abandoned owing to legal entanglements.

The *Hazel*, *Tiger* and *A. Y.*, situated ½ mile north-west of the town of Whitewater, are all Crown-granted. A tunnel of 260 feet has been run to cut the *Hazel* lead, which has a good showing of galena.

The *Porcupine* adjoins the *Whitewater* on the south-west. Galena is exposed at the surface in different places, and one of the owners has been at work running a drift eastward to catch the dip of the vein showing in the upper tunnel.

SPRING CREEK.

Work has been carried on extensively on the *Salem* and *San Antonio*. Two men have been employed on the claims all the summer, and Crown grants are being applied for.

On the *Black Prince Group*, owned by Messrs. Livers and Lemon, development was carried on with a force of two men.

AINSWORTH CAMP.

Highlander. The Highlander Mining & Milling Company's tunnel is now in about 1,800 feet, of which distance 590 feet have been driven this year, tapping the *Highlander* ledge at a depth of 900 feet. One hundred and twenty feet of cross-cuts, and 610 feet of drifts have been run on the vein, disclosing a nearly continuous ore chute the whole distance. The company is now putting a trial sample of ore through its own mill to determine the positive value. The number of men employed is 15, and the total development for the year is 1,320 feet.

Highland. The Highland (Kootenay, B. C.,) Mining Co., owning the *Highland* and several other properties situate on the north slope of Cedar creek, near the mouth, employed, in the early part of the year, 60 men in the mine and mill, and shipped about 700 tons of ore, mostly concentrates. In May the force was reduced to 8 men, who have been occupied solely in development, as follows:—No. 3, of new level, started and run 800 feet with 90 feet of cross-cuts; No. 2 level, upraise of 90 feet made; No. 1 level extended 400 feet. Total development, 1,200 feet of tunnel, 90 feet of cross-cuts and 90 feet of upraises.

The *Number One*, situated 2½ miles west of Kootenay lake, was worked on a short lease, 113 tons of ore being shipped, and 4 men employed. The property has changed hands during the past summer and is now owned by H. Giegerich *et al.*

On the *Little May*, situated north of the *Number One*, a shaft is being sunk, and is now down 60 feet. Twenty tons of ore were taken out in the development, and 3 men were employed.

On the *Omaha* and *Mount Vernon*, situated one mile west of Kootenay lake, 150 feet of tunnel were driven and 7½ tons of ore shipped, 2 men bding employed.

On the *Albion*, situate north of the *Highlander*, work was begun early in December in the main tunnel with the intention of cutting a parallel ledge. Four men were employed.

HOWSER CREEK.

Most of the men holding claims in this section have done their assessment work, but no extensive development has been done, except by the Gold Hills E. & D. Co., the Lavina Butte Mining Co. and the Irene Mining Co.

The Gold Hills Co. had six men at work on its properties from June until October.

The Lavina Butte Mining Company's property has been extensively developed during the past year. About 150 tons of clean ore are on the dump, besides a large amount of concentrates. At present there are six men at work on the property.

The *Irene Group* is situated on the east side of the Duncan river, about 7 miles north of Hall's landing. A shaft, about 45 feet deep, has been sunk on the lead, and 200 feet of cross-cut tunnel were driven during the past summer.

The *McLaughlin Group*, situated on Hammil creek, and comprising 10 claims, was recently sold to a Boston Syndicate. Development is being carried on, and it is the intention of this company to erect a mill, as there is a large amount of concentrating ore in sight. This year $600 was expended on a trail to the property.

The True Blue Copper Mines, Lt'd., owns a group of six claims. Operations were begun in March last, and seven men have been continuously employed since. Seven hundred feet of tunnels, cross-cuts and drifts have been run, and the company has now at the mine, ready for shipment, 60 tons of ore, which carries high values in copper. Bunk-houses and ore-sheds have been erected during the past summer. Application for Crown grants for the whole group is now being made.

WOODBERRY CREEK.

At the mouth of this creek is the property of the King Solomon's Mining Co., comprising nearly 35 claims. The company has sunk a winze in the workings of the previous owners and has drifted on the vein. An air compressor plant has been installed and buildings erected. The same company has purchased from C. J. Johanson *et al.*, the *Lucky Bill Group*, situated further up the creek.

The *Grant Group*, owned by Messrs. Grant and Rossiter, is a promising property. Two small shipments have been made this year.

The *Truant and Bright Hope*, owned by S. Underhill *et al.*, is situated above the *King Solomon Group*. Eighty feet of tunnel have been driven on the property this year.

On the *Tecumseh* and the *Pontiac* work has been carried on almost continuously by C. F. Caldwell. A thousand feet of drifting have been done, and there is a quantity of ore on the dump ready for shipment.

The *Sunset*, operated by the Woodberry Mines, Ltd., has 1,000 tons of ore on the dump ready for shipment.

On the *Golden Nugget Group*, owned by the Consolidated Copper Company of Minneapolis, a small force of men has been working all the summer. There are excellent showings of silver-lead ore on this property.

On the *Scranton*, owned by Austin Corbin *et al.*, 60 feet of development have been done, with good results.

The *Baltimore Group*, owned by Wm. English *et al.*, is a very promising property. Extensive development has been carried on during the summer, and a small shipment has been made.

The *Olson Group*, at the head of the south fork of Woodberry creek, is owned by Chas. Olson and Capt. G. F. Hayward. One hundred feet of tunnel have been driven on the property.

Schroeder Creek.

Values from samples of ore taken from this section are good, and claims have been located on both sides of the creek, which is easy of access and possesses excellent water-power. Large quantities of good timber are found in the neighbourhood, and deposits of limestone occur.

On the *Milford Star Group*, on Milford creek, $4,000 has been expended.

The Globe Mining Co., of Kaslo, is operating the old *Leviathan Group*. The road to the property has been improved and a small amount of development has been done during the year.

Near the latter property, and directly opposite Kaslo, marble is being quarried for building purposes, a force of men being employed all the year.

On the west fork of the Duncan river more prospecting has been done than in any other part of this Division. The *Old Gold* and *Primrose Groups* have been Crown-granted.

The London and Richilieu Co. owns the *Silver Hill*, on Crawford bay, which is now a steady shipper. The company has built a tramway from the property to the end of the Crawford bay waggon road, at an expense of $15,000.

Blue Ridge Camp.

Frank Helm, Wm. Anderson and Richard Roberts, have driven 50 feet of tunnel on the *Alhambra* and *Condor*, and have a good showing of ore carrying values in copper, gold and silver.

South Fork of Kaslo Creek.

The properties in this section have been so frequently described and are so well known that I do not think it necessary to particularise. The owners have kept up the assessment work and a few small shipments have been made, but most of them prefer to await more favourable conditions before sending out any large quantities of ore.

Fry Creek.

On this creek it is reported that large deposits of good ore, carrying values in gold and copper, exist, and it is believed that when the District is made accessible by trails or roads a very important camp will result. The trail constructed during the past year will be of assistance, but it is not sufficient to enable prospectors who are a distance up the creek to get supplies in at a reasonable cost.

Office Statistics—Ainsworth Mining Division.

Free miners' certificates (individual)	58
" " (companies)	11
" " (special)	11
Certificates of work	870
$100 payments	14
Certificates of improvements	48
New claims	388
Transfers recorded	233
Abandonments	2
Notices filed	199
Abstracts of title	52
Mining receipts issued	1286
Surveys as work	44
Water records	7
Field-notes filed	82

NELSON DISTRICT.

REPORT BY J. A. TURNER, GOLD COMMISSIONER.

I have the honour to hand you herewith the annual reports of the Nelson, Goat River and Arrow Lake Mining Divisions, which comprise the district for which I am Gold Commissioner.

The prevailing conditions have affected the mining industry adversely in this as in other districts of the Province, but the properties which have been developed during the year are, in most cases, looking well, and when the difficulties referred to are removed, I think that we can safely look forward to a period of much prosperity.

NELSON MINING DIVISION.

Hall Mines. At the Hall Mining and Smelting Company's properties 96 men are employed and a large amount of development work has been done during the year, consisting of 3,262 feet driven, raised and sunk. There have been extracted about 21,000 tons of ore.

Smelter. The smelter has been running continuously, partly on custom ore and partly on ore from the Company's own property, the *Silver King*. About 80 men have been employed by the Company at the smelter in addition to those employed at the mines.

NOTE BY PROVINCIAL MINERALOGIST.—The following notes of the operations of the Nelson Smelter have been kindly furnished by the management in response to a request for same:—

During 1901, we were treating *Silver King* ore for about five months, during which time we smelted 20,679 tons, the average assay of which was 16.1 ozs. silver and 3.8% copper.

We had one and sometimes two furnaces in blast on lead ores, and smelted of silver-lead ores and concentrates and dry ore and gold-bearing concentrates 22,220 tons, and produced 4,840 tons of bullion, containing 9,370,207 lbs. lead, 1,080,079 ozs. silver and 7,933 ozs. gold.

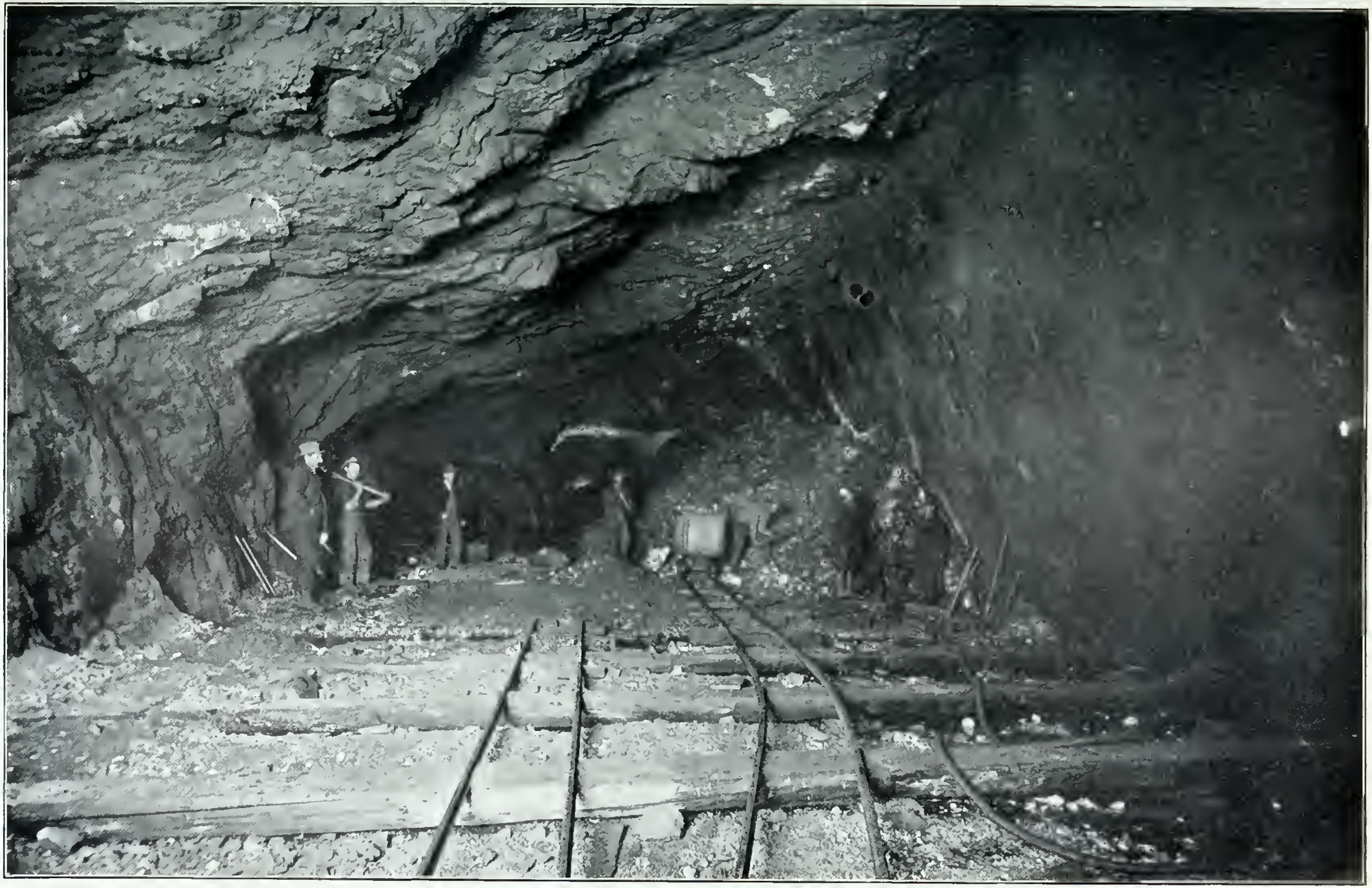
In the early part of the year we completed the construction of a straight line, double hearth, mechanical calcining-furnace, and installed a Henry S. Mould Company's briquetting plant.

At the Ymir mine about 200 men have been at work and 80 stamps have been running continuously. A very large amount of development work has been done and a tunnel, which is now in about 2,000 feet, is being run to tap the ledge at a depth of 1,000 feet.

On the *Second Relief*, at Erie, a new stamp-mill has been erected and is now running. A large amount of development work has been done and about 50 men have been employed.

On the *Keystone*, near Erie, several hundred feet of development work have been done and this is looked upon as one of the most promising shipping properties in the district.

The *Yellowstone*, near Salmo, has been worked steadily until the last month, when the mill was closed down for the winter.



STOPE, YMIR MINE.

The *Queen Group*, near Salmo, is being worked under a lease and bond and the property looks very promising.

The *May* and *Jennie*, near Nelson, have been developed by 2,000 feet of work with good results, but operations have been suspended for the winter.

The *Granite* and *Poorman*, near Nelson, now known as the Duncan United Mines, Ltd., were worked steadily until a few months ago when, on account of an accident to the mill, it was necessary to close down for repairs.

On the *Molly Gibson* a great deal of development work has been done and the property is now a regular shipper.

On the *Yellow Jacket*, near Waterloo, a new mill has been put up and a large amount of development work has been done.

Work has been done on many other properties in the district and in most cases with satisfactory results.

OFFICE STATISTICS—NELSON MINING DIVISION.

Number of claims recorded (mineral)		605
" " (placer)		3
Certificates of work issued		1265
Bills of sale recorded		338
Certificates of improvements issued		100
Agreements, options and notices recorded		47
Abandonments recorded		3
Free Miners' Certificates issued :—		
Ordinary	1290	
Special	9	
Company	27	
		1326

GOAT RIVER MINING DIVISION.

REPORT OF E. N. MURPHY, MINING RECORDER.

I have the honour to report as follows on mining operations in the Goat River Mining Division during the year ending 31st December, 1901.

There has been unusual activity in this Division during the past year, and the advancement made is extremely satisfactory.

Iron Ore.

The large deposits of hematite iron ore which, for some time, have been known to exist near the town of Kitchener, some 2 miles from the Crow's Nest Pass Railway, were acquired during the year by a Montreal syndicate which holds 15 claims by purchase, and has staked or has options upon some 21 others. Development has been extensively carried on under the direction of Mr. Wm. Blakemore.

The work done, which consists of open cuts and three shafts, the deepest 45 feet, shows the ore to occur in veins of from 6 to 18 feet in width, the average assays from which are from 55 to 65 per cent. metallic iron with practically no sulphur or phosphorus. The development is sufficient to justify the conclusion that a very large body of high grade hematite ore exists. A good deal of trail work has been done, and I am informed that in the coming spring a short branch railway will be constructed.

Mr. Blakemore states that pig iron can be produced from the ore at a cost of $10 a ton, which is considerably less than the cost of pig iron imported into the Province to-day.

Besides the holdings of the Montreal syndicate mentioned, there are quite a number of other iron claims in the vicinity of Kitchener, notable among which is the property of Mr. C. P. Hill, embracing some 20 claims, upon which a great deal of prospecting and development work has been done during the past season. It was through Mr. Hill's efforts that the iron deposits at Kitchener were first brought to the notice of eastern capitalists.

NOTE BY PROVINCIAL MINERALOGIST —The following information respecting the iron deposits at Kitchener is contributed by Mr. W. Blakemore :—

"The iron mines at Kitchener were located several years ago by Mr. C. P. Hill, of Port Hill, Idaho, and by him exploited for at least three or four seasons. Two years ago he bonded the claims to the London and B. C. Gold Fields, and that company did a limited amount of prospecting work, and drove a tunnel in the *Cracker Jack* claim a distance of 200 feet, but did not succeed in cutting a ledge of iron or in finding copper ore, for which it was primarily looking. In April of this year Mr. Hill brought the property under the notice of the writer who, having examined samples and had some assays made in Montreal, recommended it to the attention of a Montreal syndicate, the latter taking a bond that ultimately called for a cash payment of $80,000. After three months prospecting the writer advised the immediate purchase of the property, and on the 15th of August this was consummated for the amount named, the number of claims bought at that time being 15. Since then work has proceeded vigourously, 5 veins of pure ore, unmixed with deleterious matter, having been uncovered, cross-cuts in various places showing them to be respectively 8, 12, 18, 15 and 6 feet thick. The main vein, which is 18 feet thick, has been traced continuously for a distance of about 5 miles, and the geological formation favours the idea that the whole of these veins lie parallel, and continue through the property. At the present time, in addition to the 15 claims purchased, the writer has staked 6 for the syndicate referred to, and holds options upon 15 others.

"The iron bands occur in a quartzite formation running north and south throughout the length of the mountain, a distance of 10 miles, and occurring alongside a greenstone dyke, known locally as gabbro diorite. The formation is favourable to depth, and the continuity has already been established by surface prospecting. As to the quality of the iron, over 100 assays have been made, the average of which gives more than 50 per cent. of metallic iron with both sulphur and phosphorus in negligible quantities. This average, however, does not give a fair impression of the property, because so many samples were taken from surface outcrops. Three shafts have been sunk, the deepest being 45 feet, and throughout the whole of this latter there was no variation in the quality of the iron, every sample showing over 60 per cent., and some as high as 69 per cent. It is too soon yet to determine the amount of ore available, although sufficient development has been done to show that there is a very large quantity, but after another season's work it is hoped to be able to estimate this more closely. Comparing the quality of the ore with other iron ore upon the continent, it may fairly be described as the highest class of hematite, suitable for making Bessemer pig, and averaging a higher percentage of metallic iron than any other, unless it be the Michigan, whilst it is as low in sulphur and phosphorus as the Lake Superior ore, and very much lower than that found in Eastern Canada and Newfoundland. The hope and expectation is that another season's work will justify the conclusion that these deposits are of a sufficient magnitude (the quality being unquestionable) to justify the establishment of steel works whenever the Province is ripe for this enterprise."

On the *Tornado*, *Cyclone* and *Whirlwind* mineral claims, located by D. English, R. Laib and C. P. Hill, a vein of quartz and spathic iron, interspersed with galena, occurs, having a width at the surface of about 10 feet. As depth was gained the galena disappeared and was replaced by copper carrying sufficient gold values to justify the prosecution of development work on a more extensive scale.

The *Ruth*, *Morning Star* and *Evening Star* mineral claims, situated on Goat river, about 6 miles from Kitchener, were lately sold to Eastern capitalists for $8,000 cash. The claims yield high assay values in copper and gold. Considerable work has already been done on the *Morning Star*, and the showing is an exceptionally good one. The recent purchasers are already making arrangements to commence operations on a somewhat larger scale.

In the White Grouse camp, with one exception, nothing more than the annual assessments was done. W. J. Garbutt, the owner of the *Superior* mineral claim, did a considerable amount of work, and at a heavy expense had several tons of ore packed out a distance of 30 miles in order to make a smelter test. The results were satisfactory, giving returns of 22 per cent. in copper and $8 in gold per ton. It is intended to open up this property as soon as the season begins, and to continue work all the summer.

Owing to litigation, the properties of the Valparaiso Gold Mining Company and the Imperial Mines, Limited, situated on Goat creek and upon which large sums of money had been expended, have remained idle since early in the season.

Alice Group.

On Goat mountain the only property that has undergone any extensive development is the *Alice Group*, owned by the York and Lancaster Syndicate, of Manchester, England, T. G. Proctor, local manager. The work for the past year consists of 550 feet of cross-cut tunnel, 150 feet of up-raise and several hundred feet of drifting, together with extensive timber work and out-buildings. The work done was more of an exploratory nature than otherwise. A large quantity of ore was taken out and one carload was shipped to the Nelson smelter, returns from which were considered satisfactory. The continual shrinkage in lead and silver values caused the owners to discontinue work, but it is understood that as soon as the market improves, development and shipments of ore will be resumed.

On the *Jennie*, *Mafeking* and other claims, situated in close proximity to the last mentioned, good showings occur, the ore appearing to be a high-grade silver-lead.

On the lower slopes of Goat mountain large veins of quartz exist, carrying good values in copper, gold and silver. So far the work accomplished has been very small, but this is a portion of the division from which, with the expenditure of capital, good results may be looked for, and the width and evident continuity of the veins, which are well mineralised, would warrant further exploitation. Some of the most promising claims in this section and those upon which most work has been done are the *Victory*, *Gallaway*, *Kaffir*, *Annie* and *Josie*.

On the headwaters of Duck creek, John Fritsch and George Ross completed a long tunnel on the *Copper Queen* mineral claim and good values in copper have been obtained. Further south the same parties have put a shaft down about 100 feet and this shows copper ore of good grade in a vein 5 feet wide.

On both Goat mountain and near Duck creek there are a large number of prospects with good indications.

Several discoveries of free-milling ore were made during the year, notably the *Bayonne Group* on Summit creek. L. Davenport, representing Spokane parties, secured a bond on this property for $40,000. The vein is 18 feet wide and the assays run high. The Government had a gang of men at work making a trail to the property, and this was finished in time to have supplies packed up to the claims before the snow became too deep. Twelve men, I understand, are employed in development for the winter under the direction of M. Gilliam. The latest reports are encouraging, and if they continue favourable a number of prospectors will probably go into this section in the spring. Already quite a number of claims have been located in the neighbourhood.

OFFICE STATISTICS—GOAT RIVER MINING DIVISION.

Number of mineral claims recorded	270
Certificates of work issued	509
Bills of sale, bonds, etc., recorded	129
Free miners' certificates issued	211
Certificates of improvements recorded	12

ARROW LAKE MINING DIVISION.

REPORT OF WALTER SCOTT, MINING RECORDER.

I have the honour to submit my report on the Arrow Lake Mining Division for the year ending December 31st, 1901.

Little development has been done beyond the annual assessments other than is summarised below, viz.:—

Silver Bell, *Golden Rod No. 2*, *Dailstrom* and *Londonderry*, situated on Canyon creek. Work done consists of stripping the vein, which has a width of 8 feet and assays 286 oz. silver and $1\frac{2}{10}$ oz. gold per ton.

Upon the "Big vein" on Boulder mountain, Pingstone creek, there are 15 claims recorded.

Empress No. 2, *Rand*, *Shamrock*, *Emma*, *Robson*, *Iron Cap* and *Excelsior* mineral claims, and the *Golden Hope Fraction*, have been surveyed this season.

The *Empress*, *Delenger*, *Anna S.*, *Goodenough*, *Well Done*, *Forest Chief* and *Monarch* have had considerable work done upon them, and it is intended to build a waggon road, by the aid of the Government, for 8 miles, from the mouth of Pingstone creek to the claims, and machinery will then be taken in to develop the property. The width of the vein is from 30 to 60 feet, and a width of 8 feet on both walls assays $16 per ton.

On the *Outcrop*, situated at the mouth of Pingstone creek, and having the same owners as the last-mentioned property, a cabin has been built and it is proposed to drive a tunnel for 100 feet to tap the vein, which has a width of 15 feet and shows a large outcrop of copper ore. No assays have yet been made, however.

On the *Ophir Group*, situated at Cape Horn, on the east side of Upper Arrow lake, Messrs. Maxwell and Glendinning have built a cabin and intend to work on the property all the winter. The width of the vein is 40 feet and assays run 16 % copper and $2 gold per ton.

On the *Skylark Group*, situated at the headwaters of Mineral creek, considerable work has been done in stripping the vein, the width of which is about 2 feet, showing from 6 to 10 inches of free galena ore. The assays run $60 in silver and lead per ton. The owners intend building a trail from McDonald creek, Arrow lake, to the property, in order to facilitate shipment next season.

OFFICE STATISTICS—ARROW LAKE MINING DIVISION.

Number of mineral claims recorded	58
Certificates of work	94
Payment of $100 in lieu of work	1
Certificates of improvements recorded	16
Bills of sale recorded	13
Free miners' certificates issued	82

ROSSLAND DISTRICT.

TRAIL CREEK MINING DIVISION.

Report of J. Kirkup, Gold Commissioner.

I have the honour to submit my report of mining operations in the Trail Creek Mining Division during the year 1901.

Although the shipments of ore from this Division for the past year are largely in excess of those of the year 1900, they were very much curtailed on account of the labour troubles which took place early in July, and which continued, to a certain extent, during the balance of the year; in fact some of the principal mines closed down and did not resume shipping up to the end of the year.

During the past season a waggon road was constructed from a point on the Columbia and Western Railway, near the mouth of Hamil creek, to the *Bonanza* mine, on Norway mountain, thereby enabling the owners of the *Bonanza* and the Cascade Mining Company to get in supplies and ship ore at a reasonable cost. This road will be the means of opening up a very promising district which, heretofore, was accessible only by pack trail from Rossland, a distance of about 24 miles, or from Gladstone, a distance of about 6 miles. I hope to see a considerable tonnage of ore, carrying good values, shipped from this portion of the Division during the coming year.

Appended hereto is a statement showing the amount of ore shipped, the gross value thereof, the average number of men employed, the development and addition to plant during the year, together with the office statistics of this Mining Division.

The ore shipments made were approximately as follows:—

Le Roi	158,598	tons.
Le Roi No. 2	35,956	"
Rossland-Great Western Mines, Ltd	10,046	"
Centre Star	53,590	"
War Eagle	19,863	"
Iron Mask	4,224	"
Velvet	540	"
Portland	24	"
I. X. L.	188	"
Spitzee	172	"
Evening Star	73	"
Homestake	33	"
Total	283,307	"
Gross value	$4,621,299.	

NOTE BY PROVINCIAL MINERALOGIST.—The following extracts from the official reports of the two largest companies in the camp are appended as giving an accurate idea of the values of the ores and of the detailed costs of mining in this camp.

WAR EAGLE MINE.

The following is from the Report of Mr. E. B. Kirby, General Manager, as contained in the Fifth Annual Report of the Directors of the War Eagle Mine, dated January 18th, 1902:

"As explained in the last annual report, the pay ore of the main chute changes to low grade in the block between the sixth and seventh levels, at a depth of about 800 feet. There was no evidence to indicate that this change was permanent, or anything but one of the usual low-grade stretches found in ore chutes, and every effort has been made to push exploration work at high pressure. A plan of deep and large scale development is being carried out, in the course of which the branching of the vein, together with complications caused by a system of heavy faults and dykes, has greatly increased the delay and expense of exploring the vein.

"The closure of the War Eagle Mine by a general labour strike has restricted the mining of the past year to a period of about seven months. This further loss of time leaves us still short of decisive results from the great depth of vein made accessible by the rapid shaft sinking. The shaft, 1,499 feet deep on December 31st, will reach the 11th level point at 1,580 feet by the end of February, and sinking will then be suspended until decisive results are secured from the vein area then accessible.

"The levels are as follows:—

6th level	754	feet	in depth.
7th ″	881	″	″
8th ″	1,057	″	″
9th ″	1,228	″	″
10th ″	1,378	″	″
11th ″	1,580	″	″

"The 7th level is sufficiently developed for the present, showing the ore to be low-grade.

"The 8th level exploration is not yet completed. The vein exposed by it so far is low-grade or barren, but the work has not progressed far enough to be decisive, and there are still fair chances of finding pay.

"The 9th level is well under way, but has not yet reached the positions where ore is expected.

"The 10th and 11th levels have not yet been started.

"Thus, from the 7th to the 11th levels a new depth of 700 feet on the vein is now accessible, and its exploration by levels is fairly under way. What its contents may be is as yet unknown and is a matter of luck. That its possibilities are great is evident from the fact that the main chute down to the 6th level, a depth of 754 feet, has contained about 165,000 tons, with a smelter's gross assay value of $3,100,000. From the nature of the ground it is impossible to see ahead or to make any prediction as to the chances of success or failure. That these chances justify the cost of exploring it to a decisive point is beyond question. Its contents, whatever they may be, will be reached as promptly and as cheaply as possible.

"Ore shipments began January 3rd, 1901, continuing until the strike, July 12th, and were restricted to a rate sufficient to meet current expenses. On resuming work in December the Canadian Smelting Works found that its sampling plant, which was being reconstructed, had been so delayed by the failure of manufacturers to deliver machinery that it would be necessary to postpone the receipt of ore for several months.

"The ore shipments for the year amount to 19,864 tons, averaging $15.64 smelter's gross assay value. The average contents were 0.633 oz. gold, 1.08 oz. silver and 2.1 per cent. of copper.

"The ore reserves now on hand in the mine are estimated at about 25,000 tons of about $14 smelter's gross assay value (valuing copper at the price of 16.25 cents, which it has hitherto maintained).

"The work of the mine progressed without interruption up to July 12th, 1901, when it was suspended by the strike. Work was resumed in December. The mining of the year was therefore limited to about seven months.

"During this period, under the contract system and with the completed equipment, the costs of work were reduced to a much lower figure than has hitherto been reached in this district. The tables of cost herewith show the results attained. Excluding the storage ore sold, and taking only the ore mined, the costs per ton, including general expenses and development, were $2.59 for ore production and $4.74 for development, a total of $7.33 per ton of ore mined.

"It will be noticed that the small tonnage of 19,864 tons shipped this year, in comparison with the development work necessary, has made the development cost per ton heavy. It has also made each ton bear more of the general expenses than would be the case with a larger production. The results, nevertheless, show the improvement effected in costs of mining."

The following tables are extracted from the report :—

WAR EAGLE MINE.

"COMPARATIVE STATEMENT OF WORK DONE AND ITS COST, GENERAL EXPENSES INCLUDED, PER FOOT OR TON, TO DEC. 31ST, 1901.

	1897 Jan. 20 to Sept. 30.			1898 Oct. 1, 1897, to Sept. 30, 1898.			1899 Oct. 1, 1898, to Dec. 31, 1899.			1900 Jan. 1 to Dec. 31, 1900.			1901 Jan. 1 to Dec. 31, 1901.		
	Work done feet or tons.	Total Cost.	Cost per foot or ton.	Work done feet or tons.	Total Cost.	Cost per foot or ton.	Work done feet or tons.	Total Cost.	Cost per foot or ton.	Work done feet or tons.	Total Cost.	Cost per foot or ton.	Work done feet or tons.	Total Cost.	Cost per foot or ton.
DEVELOPMENT WORK.															
General work, stations, re-timbering, machinery, repairs, etc., etc.	......	$3,770 18	.....	......	$18,249 34	.....	......	$13,727 53	......	.....	$22,681 59	.....	.....	$15,797 06	.....
Sinking main shaft, feet	175	16,150 31	$92 29	185	17,808 99	$96 26	192	23,180 56	120 73	355	45,460 86	128 06	259	23,862 45	$92 13
Sinking small shafts or winzes, feet	.....	....	.....	......	....	.....	49	2,176 88	44 42	26	1,533 81	58 99	....	....	.....
Raising, feet	421	12,768 93	30 33	451	13,726 95	30 43	670	24,665 01	36 81	669	29,151 45	43 57	66	2,560 62	38 79
Drifting, feet	2,303	46,313 33	20 11	3,480	74,958 25	21 54	2,721	64,777 92	23 81	3,378½	101,530 41	30 05	2,180	49,800 10	22 84
Total development work	2,899	$79,002 75	......	4,116	$124,743 53	.....	3,632	$128,527 90	......	4,428½	$200,358 15	.....	2,505	$92,019 83	.....
ORE PRODUCTION.															
Ore from development work sold, tons	2,596	....	.....	2,316	....	......	3,563	....	......	4,373	....	......	1,501	....	......
Ore from dumps, storage, etc., sold, tons	......	....	... ..	......	....	.....	4,484	2,815 55	63	......	....	.....	453	695 63	1 54
Stoped ore sold, tons	4,810	15,634 94	3 24	26,559	86,070 10	3 24	65,889	258,298 19	3 92	5,513	48,130 18	.....	17,910	50,336 10	2 81
Total ore sold, tons	7,406	$15,634 94	2 11	28,875	$86,070 10	2 98	73,936	$261,113 74	3 53	9,886	$48,130 18	......	19,864	$51,031 73	2 57
SUMMARY.															
Expense of development (per ton of ore sold)	7,406	79,002 75	10 67	28,875	$124,743 53	4 32	73,936	$128,527 90	1 74	9,886	200,358 15	20 27	19,861	92,019 83	4 63
Expense of production (per ton of ore sold)	7,406	15,634 94	2 11	28,875	86,070 10	2 98	73,936	261,113 74	3 53	9,886	48,130 18	4 87	19,864	51,031 73	2 57
Total expenditure	7,406	$94,637 69	$12 78	28,875	$210,813 63	$7 30	73,936	$389,641 64	$ 5 27	9,886	$248,488 33	$25 14	19,864	$143,051 56	$7 20

"TABLE OF MINE COSTS, TWELVE MONTHS ENDING DEC. 31ST, 1901.

	DEVELOPMENT WORK.			ORE. EXTRACTION.
	Sinking.	Raising.	Drifting.	Stoping.
Total advance, feet	259	66	2,180	....
Ore stoped, tons	....	....	....	17,910
		Cost per foot.		Cost per ton.
Drilling	$13 15	$9 19	$4 96	$0 43
Blasting	5 82	1 76	99	04
Explosives	4 92	2 64	2 52	13
General mine supplies	1 71	98	65	08
Mine lighting, candles	42	25	16	02
〃 electric	69	30	20	03
Smithing	97	1 48	74	07
Shovelling, direct	18 80	1 41	1 69	28
〃 apportioned	1 31	60	47	11
Timbering, labour	6 63	3 27	06	18
〃 material	4 94	86	04	11
Machine drill fittings	97	1 42	76	07
General mine labour	5 66	3 64	2 27	28
Hoisting, underground	8 75	....	20	....
〃 main shaft	3 65	1 21	1 16	23
Compressed air	1 33	2 13	1 00	09
Mine ventilation	1 23	96	51	06
Assaying	03	33	20	07
Surveying	68	49	31	04
General expense	10 47	5 87	3 95	49
	$92 13	$38 79	$22 84	$2 81

"STATEMENT SHOWING VALUES AND SMELTING CHARGES PER TON TO DEC. 31ST, 1901.

	Year.	Real or Full Assay Value. Total metallic contents at full N. Y. quotations.	Indirect Smelting Charge. Difference between N.Y. quotations and smelter's prices for the metals.	Direct Smelting Charge Including freight from the mine.	Total Smelting Charge. Direct and indirect.	Smelter's Gross Assay Value After deducting indirect charges only.	Smelter's Net Value After deducting both the indirect and direct charges from the real assay value (*i.e.* net value of ore f.o.b. cars at mine.)
....	1894	$43 54	$6 63	$12 50	$19 13	$36 91	$24 41
....	1895	47 33	7 41	10 87	18 28	39 92	29 05
....	1896	36 97	5 79	9 89	15 68	31 18	21 29
Jan. 20th to Sept. 30th	1897	27 64	4 43	9 96	14 29	23 31	13 35
12 months ending Sept. 30th	1898	26 63	6 62	7 50	14 12	20 01	12 51
15 〃 Dec. 31st	1899	21 63	4 91	6 25	11 16	16 72	10 47
12 〃 Dec. 31st	1900	19 08	4 68	6 00	10 68	14 40	8 40
12 〃 Dec. 31st	1901	20 71	5 07	6 00	11 07	15 64	9 64

LE ROI MINE.

Tons of ore shipped (dry)	158,598	
Average number of men employed	302	
Underground	231	
Surface	71	
Development :		
Shafting	227	feet.
Driving	1,517	"
Raising	487	"
Cross-cutting	625	"
Winzing	43	"

Additions to plant for this year consist of completion of ore bins, head frame, sampling mill, ærial tram and hoist engines. The value of mining plant, machinery and buildings is $280,890.

The following is an extract from the report made by Mr. R. J. Frecheville, M. I. C. E., to the directors of the Le Roi Mining Co., and dated Rossland, Dec. 4th, 1901 :—

Geological Features.

"There are in the *Le Roi* claim the outcroppings of three veins, known as the north vein, middle or main vein, and south or Black Bear vein. Of these, the middle or main vein is the most important, and has been by far the most extensively developed. It strikes 22 degrees south of west, and dips north about 70 degrees from the horizontal. The south vein, on which there are considerable developments, and which has a similar strike and dip, occurs about 250 feet to the south of the middle vein. Of the north vein, but little is known beyond the outcrop. The formation of Red mountain consists of a variety of diorite known as 'gabbro.' The veins are sheer zone fissures—that is, they are the result of very powerful compression. They have been mineralised by the action of deep-seated thermal waters. In the *Le Roi* claim they range in width from 6 feet up to 100 feet. Their filling consists of altered country rock, through which is distributed pyrrhotite and chalcopyrite, with gold varying in quantity from a trace up to over an ounce per ton. The copper contents average about 1.33 per cent., and there is also a small amount of silver. The veins are intersected by numerous dykes, having a composition very similar to the country rock. These dykes vary in thickness from a few inches to several feet; they interrupt temporarily the continuity of the ore bodies, but do not displace them. The *Josie* dyke, however, which occurs about 100 feet east of the boundary line separating the *Le Roi* from the *Black Bear* claim, appears to be an exception, for no ore-bearing ground has as yet been found to the west of it in the *Black Bear* claim, although considerable exploratory work has been done at the 600-foot level, with the object of picking up the continuation of the veins to the west of the dyke. The *Josie* dyke is about 150 feet thick, and reduces the length of ore-bearing ground in the *Le Roi* claim to about 1,400 feet.

Mine Workings.

"The mine is opened out by two incline shafts on the middle vein, called the old shaft and the combination shaft. The former, which is down to the 900-foot level, is situated about 200 feet west of the *Centre Star* boundary line, and the latter, which has reached the 1,050 level, is 360 feet further west on the strike of the vein, or nearly in the centre of the developed ore shutes. The old shaft has recently been straightened and partially re-timbered at a cost of about $5,500, but is not now used and most probably never will be again. This expenditure might well have been saved. The Combination Shaft is the working shaft of the mine. It is 275 feet long by 6 feet wide in the clear of timbers, and is divided into five compartments. At the 1,050-foot level the station has been cut, but the levels are not yet driven. The 900-foot level is the deepest level in the mine. This shaft has cost in round figures about $100,000. It is a fine piece of work, but is unnecessarily large. The ground proved to be ore-bearing extends from the *Centre Star* boundary line on the east to the *Josie* dyke on the west, a distance of between 1,300 feet and 1,400 feet. At the 500-foot level the combined length of the pay chutes on the middle vein is about 745 feet. On the 600-foot, 700-foot and 800-foot levels it is about 900 feet for each level. The width of the chutes varies from 6 feet up to 100 feet. On the 900-foot level, which is only partly opened, the pay chute has a length of 170 feet by a width of 24 feet. The general trend of the ore bodies appears to be to the west; thus at the 900-foot level no pay ore has been opened out east of the Combination Shaft. If the present chute now being opened out at this level extends uninterruptedly up to the *Josie* dyke, its length cannot exceed 700 feet. This shortening of length is so far compensated by considerably greater average assay value. The western portion of the south vein has been opened by cross-cuts from the middle vein at the 500-foot and 700-foot levels, showing a chute of ore about 140 feet long, with an average width of 18 feet. The ore is of lower grade than that of the middle vein.

Ore Production.

"The ton used in this report is the American ton of 2,000 lbs. In stating value the basis taken is gold $20 per ounce, silver 60 cents per ounce, and copper 16.5 cents per pound. About 20 per cent. of waste is sorted out of the ore hoisted from the mine, so that the shipping ore is of higher grade than the mine ore. For the year ended June 30th, 1900, 102,784 tons, containing a gross value of $1,441,128—that is $14.02 per ton—were shipped over the Great Northern Railway to your smelting works at Northport, distant 18 miles from your mines. For the year ended June 30th, 1901, there were shipped 202,582 tons, of a gross value of $2,665,689—that is, $13.16 per ton. For the first seven months of this latter year the ore averaged $14.38, and for the last five months $11.80 per ton. It is thus clear that the cream of the reserves was skimmed off during the first seven months. During July, August, and September of the present year no ore was mined on account of the strike. In October, 9,737 tons, averaging $11.67 per ton, were shipped, and in November 12,943 tons, of an average assay value of $11.57.

Middle Vein.

"Quantity and value of ore reserves:—In the following estimates 10 cubic feet of ore in place are reckoned as equal to one ton. As no proper assay records have ever been kept, and as I found all the information given to me to be most misleading, I found it necessary, in order to arrive at the quantity and value of the ore reserves, to prepare a complete set of assay plans. Owing to the wide vein and the hard character of the ground it was not possible to take more than about 15 samples per day. As nearly 700 samples were taken altogether the arduous and lengthy nature of this work of sampling the mine will be apparent. Between the 300-foot level and surface the ore-bearing ground is all worked out, with the exception of three small blocks to the east of the Old Shaft, containing 21,500 tons, of an average assay value of $10.75; between the 300-foot and 450-foot levels there is no pay ore left—where any ground is standing the values are practically nil; between the 450-foot and 500-foot levels there are 57,740 tons, of an average assay value of $9.90; between the 500-foot and 600-foot levels there are 27,440 tons, of an average assay value of $12.92; where this ore stands the ground is so badly caved that it is questionable whether this ore can be mined. Between the 600-foot and 700-foot levels there are 113,980 tons, of an average value of $10.99; between the 700-foot and 800-foot levels there are 215,340 tons, of an average value of $10.32; between the 800-foot and 900-foot levels there are 96,000 tons, of of an average assay value of $11.32.

South Vein.

"Between the 500-foot level and surface there are 28,000 tons, of an average value of $9.31. Between the 500-foot and 700-foot levels there are 44,800 tons, of an average value of $6.23.

Summary. "The above figures show that there are in sight on both veins 604,840 tons of mine ore of an average assay value of $10.36. The mine ore, after passing through the crusher on the head-gear of the combination shaft, falls into receiving bins, and from these is fed automatically on to three steel endless conveying belts, each 100 feet long, travelling at the rate of 45 feet per minute before the sorters, who pick out the waste. A daily record is kept of the number of tons of waste trammed to dump. From these records it appears that 20 per cent. of waste is picked out from the ore hoisted. I had all the waste dumps carefully sampled, several bulk samples of about 30 tons each being taken and passed through the sampling mill. These samples showed the waste dumps at the combination shaft proceeding from the sorting tables now in use to assay on the average $5.32 per ton; we have then 604,840 tons of mine ore at $10.36 per ton, containing a gross value of $6,269,713; less 120,968 tons of waste at $5.32, containing a gross value of $643,549; leaving 483,872 tons shipping ore, containing $5,626,163, that is, $11.75 per ton. The metallic contents per ton of this grade of ore are: gold, 0.35 oz., silver, 0.6 oz., and copper 1.33 per cent.

Useless Work. "At the 900-foot level, opposite the old shaft, a cross-cut has been driven to the north for a distance of 870 feet, passing through the *Josie* claim into the *Number One* claim. This cross-cut, which cost $23.75 per foot, was driven for no other purpose than developing the *Le Roi No. 2;* nevertheless the whole cost, amounting to $20,622.50, has been paid by you.

Working Costs. "Messrs. Price, Waterhouse and Company, make the total costs on this side for the year ended June 30th, 1901, to be $10.72 per ton of ore, segregated as follows:—

	Per ton.	
Stoping, hoisting, tramming, storing and loading ore	$3.487	
Exploration	0.423	
Depreciation—		
Mine equipment	0.080	
Surface improvements	0.050	
Mine machinery	0.106	$ 4.146
Freight on ore to smelter		0.510
Smelter expenses	$ 4.465	
Interest and discount (on ore in yard)	0.137	
Depreciation	0.232	4.834
Matte expense—		
Sacking and crushing	$ 0.044	
Freight on matte to refiners	0.536	
Eastern representative	0.028	
Bank charges	0.092	
Refiners' toll and deductions	0.534	1.234
Total		$10.724

"The average gross value of the 202,582 tons of ore shipped to your smelting works at Northport during the same year was $13.16 per ton. The above working costs make the net profit on this ore $2.44 per ton, or $494,300 on the whole tonnage. The actual profit based on matte sold cannot be given, as together with your ores about 26,000 tons of purchased ores and concentrates were smelted. The management has been most loose and extravagant;

great reductions can be made in the costs of both mining and smelting, especially the latter; much useless extraneous expenditure can be cut off, the result being, I am of opinion, that in the future the total costs will not exceed $9 per ton. With the grade of ore you have now in reserve this will leave a profit of $2.75 per ton.

Second-Class Ore Dump.

"This dump was taken over at the time of the purchase of the mine During the year ended June 30th, 1901, 10,454 tons were sold to the Trail smelter, where they were used as a flux for lead ores, and realised net $50,556. Deducting from this amount 25 cents per ton for loading on cars, the balance of $17,943 is profit; but of this amount only $12,400 should, in the opinion of Messrs. Price, Waterhouse & Co., be credited to the profits of the year under review, the balance being credited to the cost of property account. Since June 30th last a further 11,270 tons have been sold, realising $53,921. Just how much of this dump remains it is impossible to say, owing to the irregularities of the ground occupied by it, and the fact that it merges into, and is partially covered by, a dump of waste, but it may be taken as an asset representing about $100,000 net.

Waste Dumps.

"There are four of these dumps, containing altogether about 90,000 tons. Half of this tonnage proceeds from the sorting tables at the Combination Shaft, and assays per ton as follows:—Gold, 0.18 oz.; silver, 0.3 oz.; copper, 0.8 per cent.; that is, a money value of $5.32. The other half is from the previous sorting, when the mine was worked through the old shaft, and assays:—Gold, 0.18 oz.; silver, 0.4 oz.; and copper, 1.1 per cent.; that is, $7.17 in money. These dumps are now being added to at the rate of about 3,000 tons per month; but the value of the waste now sorted out has been reduced to under $5 per ton, due to a system that I have introduced of having it sampled and assayed daily. It may be that this waste can in the future be profitably treated, and experiments are now in progress as to the best method of accomplishing this.

Mine Equipment.

"At the Combination Shaft there is a fine massive head-gear, 85 feet high, with first-class crushing, conveying, sorting and sampling machinery, all driven by electric power. There is also an automatically-working aerial tram-line leading to the ore-bins on the Great Northern Railway. There are two double-cylinder modern-type winding engines, one of 1,000 nominal horse-power and the other of 500 nominal horse-power. The larger engine is used exclusively for hoisting ore, skips of 4 tons capacity being used. The smaller engine is used for the purpose of raising and lowering men, tools, timber, etc. The boiler and compressor plant, together with fitting shop, timber-framing shed, blacksmith's shop, store, etc., are situated on the *Black Bear* claim, about 800 feet distant from the shaft. There are 11 boilers, of a capacity of 2,000 nominal horse-power, and two large cross compound air compressors, each capable of running 40 3¼ inch drills at sea-level. The plant is substantially erected and first-class in every respect; but both it and the Combination Shaft are out of all proportion to the capacity of the mine, as they could easily handle 2,000 tons of ore per day."

LE ROI NO. 2 MINING COMPANY.

Josie and No. 1 Mines.

Tons of ore shipped (dry)	35,956
Average number of men employed	120
Underground	100
Surface	20

Development :	
Shafting	462 feet.
Driving	1,220 "
Raising	546 "
Cross-cutting	1,444 "
Winzing	213 "

No additions to plant during year.

ROSSLAND-GREAT WESTERN MINES, LIMITED.

Nickle Plate Mine.

Tons of ore shipped (dry)	10,046
Average number of men employed	64
Underground	48
Surface	16
Development :	
Shafting	123 feet.
Driving	614 "
Raising	372 "
Cross-cutting	502 "
Winzing	289 "

Additions to plant for this year consist of 850 horse-power compressing plant.

COLUMBIA MINING COMPANY, LIMITED.

Columbia and Kootenay Mines.

Tons of ore shipped	*Nil.*
Average number of men employed	13
Underground	8
Surface	5
Development :	
Shafting	150 feet.
Driving	394 "
Cross-cutting	118 "

CENTRE STAR MINE.

Tons of ore shipped (dry)	53,590
Average number of men employed	268
Underground	127
Surface	81
Development :	
Shafting	252 feet.
Winzing	56.5 "
Raising	291.5 "
Driving	1,619 "

Certain additions to the plant have been made during the year, the present value of which is $260,000.

IRON MASK MINE.

Tons of ore shipped (dry)	4,224
Average number of men employed	40
Underground	30
Surface	10

Development :	
Shafting	20 feet
Driving	867 "
Raising	918 "

No additions to plant during the year.

VELVET MINE.

Tons of ore shipped (dry)	540
Average number of men employed	57
Underground	27
Surface	30
Development :	
Shafting	336 feet.
Driving	700 "
Raising	135 "
Cross-cutting	210 "
Tunnelling cross-cut	425 "
" driving	312 "

Additions to plant :

Two 75 horse-power multitubular boilers.
One 150 horse-power air compressor.
" 75 horse-power double drum hoist.
" 200-gallon sinking pump.
" 40-gallon feed pump.

PORTLAND MINE.

Tons of ore shipped (dry)	24
Average number of men employed	6
Underground	5
Surface	1
Development :	
Shafting	71 feet.
Driving	125
Cross-cutting	9
Tunnelling	86

No additions to plant were made during the year.

SPITZEE MINE.

Tons of ore shipped (dry)	172
Number of men employed	5
Development :	
Shafting	40 feet.
Driving	130 "
Cross-cutting	55 "

Plant consists of shaft house with 20 horse-power boiler and hoist.

I. X. L. MINE.

Tons of ore shipped (dry)	188
Number of men employed	6
Development :	
Driving	220 feet.
Raising	100 "

No additions to plant during year.

EVENING STAR MINE.

During the early part of the year 73 tons of ore were shipped from this property, at which time about 25 men were employed.

HOMESTAKE MINE.

Tons of ore shipped	33
Average number of men employed	16
Underground	11
Surface	5
Development :	
Shafting, 3-compartment shaft	100 feet.
Driving	964 ″
Cross-cutting	154 ″

No additions to plant during year.

GREEN MOUNTAIN MINE.

Tons of ore shipped	*Nil.*
Average number of men employed	15
Underground	8
Surface	7
Development :	
Shafting	250 feet.
Driving	100 ″
Cross-cutting	100 ″

Additions to plant for the year consist of one 60 horse-power boiler.

WHITE BEAR MINE.

Tons of ore shipped (dry)	*Nil.*
Number of men employed	12

Development consists of sinking main shaft.

Additions to plant during year consist of a 30 horse-power hoist and cage.

BIG FOUR CONSOLIDATED MINES.

Number of men employed	5
Development :	
Tunnelling	200 feet.

DOUGLAS HUNTER MINE.

Number of men employed	4
Development :	
Driving	250 feet.
Cross-cutting	60 ″

NORTHERN BELLE MINE.

During the early part of the year 50 feet of tunnelling was done, 4 men being employed.

ABE LINCOLN No. 1 MINE.

During the past year the following development work has been done on this property :—

Enlarged a shaft from single to double compartment and timbered	200 feet.
Cross-cutting	20 ″

Additions to plant consist of:

One 30 horse-power hoist driven by a 15 horse-power induction motor.
One 24-in. fan.
One electric drill which has not been definitely installed, being only on trial.

Buildings: Head frame, shaft house, hoisting room and blacksmith's shop.

ST. ELMO MINE.

Number of men employed	6
Development:	
Shafting	12 feet.
Cross-cutting and drifting	665 „

GIANT MINE.

The only work done on this property during the past year consisted of a little surface prospecting and about 30 feet of cross-cutting underground, 6 men being employed for two months.

HEATHER BELL MINE.

This property, situated near the head of Sullivan creek, was worked on a small scale during a portion of the year, about 50 feet of cross-cutting and drifting being done and 3 men being employed.

ROSSLAND-BONANZA MINE.

This property is situated on Norway mountain, and during the past year very little development work was done on account of no facilities for shipping. The work to date on this property consists of 275 feet of drifting, 15 feet of winzing and 15 feet of cross-cutting, and I have received a notice to the effect that shipments of ore would commence immediately after the first of January, 1902.

CASCADE MINE.

This property is also situated in the Norway Mountain district, and during the past season 6 men have been employed, the development work consisting of 110 feet of shafting and about 300 feet of tunnelling. During the past year the property has been supplied with 2,000 feet of rails and fixings complete, together with an ore car.

NOTE BY PROVINCIAL MINERALOGIST.—The following notes of the plant and operations of the Trail Smelter have kindly been supplied by the management in response to a request for same:—

Trail Smelter.

The copper furnaces (of which there are three) were only operated to any extent during the first six months of the year and were only smelting by-products in the last six months, consequently putting through practically no ore. The total tonnage for the year was about 100,000 tons. Only one lead furnace was run (there are three) during most of the year, although during the latter part there were two in operation for some of the time. About 50,000 tons of ore were smelted in the lead furnace, making the total amount of ore treated in both furnaces about 150,000 tons.

The maximum tonnage of material smelted in the copper furnace was about 500 tons per day; the maximum tonnage in the lead furnace about 250 tons per day.

The production of copper matte amounted to about 4,500 tons, which contained approximately:—Gold, 45,000 ozs.; silver, 210,000 ozs.; copper, 4,700,000 lbs.

Of lead bullion, 6,300 tons were produced, containing approximately:—Gold, 25,000 ozs.; silver, 1,000,000 ozs.; lead, 12,500,000 lbs. This would make the gross value of metals shipped approximately as follows:—

Gold	$1,500,000
Silver	700,000
Copper	750,000
Lead	375,000
Total production of works	$3,325,000

During the year the electrical power was increased to 1,000 h.p., and two additional large blowers were installed. Two new lead furnaces were also constructed, an electric tramway for handling ore was built from the copper sampling mill to the roast heaps and return, and there were expended in enlargements and improvements about $65,000.

The present plant consists of 3 copper blast furnaces, 3 lead blast furnaces, 1 softening furnace, 2 O'Hara roasters, 6 Bruckner roasters, 10 hand roasters for lead ores, 24 roasting stalls, 2 lime kilns, and two briquetting plants. There are two separate sampling mills, one for copper ores and the other for lead ores, together with transformers, motors and other electrical appliances for a total of 1,000 horse-power. There are, also, a complete assay office and laboratory, machine and blacksmith shop, carpenter shop and boiler shop.

The present capacity of the works is about 1,200 tons of ore daily, and they can handle and purchase both lead or copper ores.

The value of the property, with its water-works, electric light plant (the smelter generates its own electricity, and lights the town of Trail besides lighting its works), lime quarries, etc., is close to $1,000,000.

OFFICE STATISTICS—TRAIL CREEK DIVISION.

Mineral claims recorded	163
Placer " "	1
Certificates of work	338
Money paid in lieu of work	11
Certificates of Improvement	64
Bills of Sale, Transfers, etc	114
Abandonments	2
Water Grants	2
Free Miners' Certificates, personal	975
" " company	32
" " special	13
Mining receipts (25c. per acre tax on Crown-granted claims)	$1,301

BOUNDARY CREEK DISTRICT.

KETTLE RIVER MINING DIVISION.*

Report of Wm. G. McMynn, Gold Commissioner.

I have the honour to submit my report of operations in the Kettle River Mining Division during the year 1901. For the information obtained I am largely indebted to Mr. E. Jacobs.

The mining industry made very substantial progress in the Boundary District during the year 1901, as demonstrated by the large increase in the tonnage of ore mined and smelted in the District. The term "Boundary" includes the Kettle River, Grand Forks and Osoyoos Mining Divisions. These Divisions are so closely connected in the operation of their mines and smelters that to separately note the advancement in the one or the other would render somewhat disconnected and incomplete a review of the progress made in the District as a whole. For instance, last year the Granby Company's mines, situate in the Kettle River Division, shipped 231,762 tons of ore to the same company's smelter, situate in the Grand Forks Division, which, by the way, was until recent years a part of the Kettle River Division. Again, the B. C. mine, in the Grand Forks Division, which had previously sent its output to the Trail smelter, during the latter part of 1901 shipped about 16,000 tons of ore to the B. C. Copper Company's smelter, which is at Greenwood, in the Kettle River Division. To admit, though, of each Division being duly credited with its fair share of progress made, the following statement will serve to indicate the locations of the more important mines, respectively:—

Kettle River Division.

Old Ironsides and Knob Hill Group,
Mother Lode Mine,
Carmi ″
King Solomon ″
No. 7 ″
Sunset and Crown Silver Group,
Jewel Mine,
Morrison ″
Ruby ″

Grand Forks Division.

B. C. Mine.
Winnipeg Mine,
Athelstan ″
R. Bell ″
Golden Crown Mine,
City of Paris ″
Oro Denoro ″
Gold Drop ″
Snowshoe ″

The two most striking features of the year are the very large increase in the tonnage of ore produced, as compared with the production of the previous year, and the singularly successful operation of the two district smelters. In regard to the former, though, it should be mentioned that ore shipping in 1900 was confined almost altogether to the latter half of the year, shipments to June 30th having aggregated only about 4,000 tons The following table shows the tonnage of ore shipped by individual mines during both 1900 and 1901, the aggregate tonnage for both years having been approximately 484,512 tons:—

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* Note.—*See* also Report of Provincial Mineralogist on the Kettle River Mining Division.

APPROXIMATE TONNAGE OF ORE SHIPPED.

	1900.		1901.
Old Ironside and Knob Hill Group	64,531 tons	....	231,762 tons.
Mother Lode	5,564 „	....	99,548 „
B. C.	19,618 „	....	47,517 „
Golden Crown	2,241 „	....	......
City of Paris	2,000 „	....	......
Winnipeg	1,076 „	....	977 „
Snowshoe	297 „	....	1,731 „
Athelstan	1,200 „	....	550 „
Carmi	......	....	885 „
King Solomon	......	....	850 „
No 7	......	....	665 „
R. Bell	......	....	480 „
Sunset	......	....	800 „
Jewel	160 „	....	325 „
Brooklyn	150 „	....	.....
Ruby	.....	....	85 „
Sundry small shipments	1,000 „	....	500 „
	97,837 tons	....	386,675 tons.

Approximate subdivision of Tonnage.

From mines in Kettle River Division	70,705 tons	....	335,170 tons.
„ „ Grand Forks Division	27,132 „	....	51,505 „
	97,837 tons.	....	386,675 tons.

It is regrettable that, with the exception of three large properties, the District produced comparatively so little ore—less than 8,000 tons—from more than a dozen mines that it has been cumstory to designate "shippers." The prospects are, however, favourable for an early and distinct improvement in this respect. It may be mentioned that no account is taken above of the Cariboo mine, at Camp McKinney, which is now in the Kettle River Division.

MINING DEVELOPMENT.

Coming now to the mining work done in the several camps of the Kettle River Division, it must be admitted that in 1901, as in the previous year, by far the greater part of the work done was on a comparatively few properties. The Granby Company's *Old Ironsides* and *Knob Hill Group*, and the British Columbia Copper Company's *Mother Lode* mine have well maintained their leading positions in this connection, and it is gratifying to find that the Dominion Copper Company's *Brooklyn* and *Stemwinder Group;* the Snowshoe Gold and Copper Company's *Snowshoe;* the Montreal and Boston Copper Company's *Sunset* and *Crown Silver*, the *Jewel*, *Morrison*, *No. 7*, *King Solomon*, and *Ruby* have together contributed materially to the district's progress.

GREENWOOD CAMP.

Old Ironsides and Knob Hill Groups.

Greenwood Camp easily leads, both in regard to development work and output of ore, which latter was 233,493 tons out of a total for the district of 386,675 tons. Of this quantity 231,762 tons were shipped by the Granby Company's *Old Ironsides* and *Knob Hill* groups, in the following monthly proportions:

January	18,050 tons.	July	18,182 tons.
February	17,360 "	August	20,218 "
March	19,208 "	September	19,266 "
April	18,904 "	October	20,722 "
May	18,113 "	November	20,824 "
June	19,319 "	December	11,596 "
Total			231,762 "

This quantity, added to the previous year's tonnage of 64,531 tons, gives a total output during less than 18 months (this group commenced shipping on July 11th, 1900), to January 1st, 1902, of 296,293 tons. The footage of development work done during 1901, totalled 3,909 lineal feet, of which 817 were sinking and raising, and 3,092 drifting and cross-cutting. These figures show the number of feet done in underground development work proper and leave out of consideration the numerous large drifts and raises made in the immense bodies of ore preliminary to opening out the very big stopes characteristic of these mines Added to the development done to January 1st, 1901, this footage makes the grand total to be 13,962 lineal feet, 2,463 feet being sinking and raising and 11,499 feet cross-cutting and drifting. One of the most remarkable phases of mining in the Boundary compels attention at the Granby Company's mines, viz., the extensive ore quarries on the *Knob Hill*, making practicable an output limited only by the number of men working and the transportation facilities available. When the preparations now approaching completion, for running the railway ore cars right into the quarries and loading them by means of steam shovels, shall have been carried out, the producing capacity of these mines will have been so largely increased that it will not be surprising—if no unforeseen contingency arise to interfere with present plans—to find the output from these properties alone reach figures by the close of 1902 that will exceed last year's total tonnage for the whole district. These large surface quarries have been opened on the northern side of the hill, along a distance, southwards from their starting point, of about 900 feet, in ore which is known to extend about 3,000 feet in length on the Company's ground. Similar work has been commenced from the south end, on the southern slope of the hill, working northwards. Where stripped on the northern slope this ore body has a width of from 300 to 400 feet, but it has not yet been worked to more than about a third of that width. As now opened the deepest face is about 20 feet, but a big cut is being run into the hill from a lower level that will eventually give an open face of more than 200 feet in maximum depth. The *Knob Hill* main tunnel is 84 feet vertically below the floor of the largest quarry as now opened, and six large raises have been made at intervals of 100 feet from the tunnel to the quarry, these serving as chutes down which the ore is now thrown and whence it is run through the tunnel to the ore bins. As these raises are also in ore, there is now a workable face of ore 164 feet in depth down to the tunnel level. Looking at this big body of ore the statement made that it will ere long be quite practicable to ship from the quarry alone 1,000 to 1,200 tons of ore a day, loses all appearance of exaggeration. This, it must be remembered, leaves altogether out of consideration the additional output that can be maintained from the underground workings of the *Ironsides* and *Victoria*, both of which mines have in them large reserves of ore blocked out and available whenever the treatment capacity of the Company's smelter shall be increased to 2,000 tons a day, as has been stated it shortly will be.

The work of sinking a five-compartment main working shaft, to serve for all three of the Company's developed mines, was commenced towards the close of the past summer. The site chosen for it is near the southern boundary line of the *Victoria*, and is centrally situated so as to be in a convenient location for other claims the Company also owns, and which have yet to be developed. There is not much to be added regarding the underground workings of these—for this district—extensively developed mines. Mention was, on a former occasion, made of the fact that in addition to the footage of development work done some 2,700 feet of diamond drill holes had been put in. Assurance has been received from an authoritative source that the drill proved the existence of ore down to a depth of 800 feet at least.

The most important addition to the plant at these mines during the year was a timber framing machine, the first of its kind yet installed on a mine in the district. It is a single-ended framer complete, with wedge sawing machine and having a swinging cut-off saw. The motive power is furnished by a 45 horse-power Meyers cut-off engine made by the Jenckes Machine Company, which supplied the plant, engine, shafting, pulleys, etc., having manufactured them at its own works at Sherbrooke, Quebec; while the framer and carriage were procured from the Denver Engineering Works, Colorado. A 5 by 5 Bacon hoist was obtained for use in hoisting rock and lowering timbers at the new shaft until such time as a large hoisting engine shall be required. The new buildings erected during the year include a 40 by 60 building for the timber framer, and six more cottage residences for married employees. Among many other improvements made was the laying of about 3,000 feet more of railway track to facilitate the shipment of ore. The number of men on the pay roll at the close of the year was 230.

Brooklyn and Stemwinder Group.

No recent reliable information is at present available to the writer relative to the Dominion Copper Company's mines, the *Brooklyn*, *Stemwinder*, *Idaho* and *Rawhide*, but it is known that during the greater part of the year from 50 to 90 men were employed in development work, chiefly on the *Brooklyn*, and that the first half of a 20-drill air compressor was brought in to that mine. A shaft was sunk on the *Idaho* and some cross-cutting done, while on the *Rawhide* a shaft was put down and connection was made therewith by a long tunnel driven in the hill at a low level, the shaft having passed through some good ore.

DEADWOOD CAMP.

Mother Lode.

Deadwood camp ranks next in importance, its contribution to the District's total output having been a little more than 100,000 tons of ore, of which 99,548 tons were shipped by the B. C. Copper Company's *Mother Lode* mine. This mine employed throughout the year from 120 to 150 men in development work, ore producing and making substantial improvements. The "pillar and stope" system having been adopted, much work was done during the year in arranging the mine for permanent working accordingly. In connection with opening up the stopes, from 300 to 400 feet of raising was done. A raise was also made from the 300-foot to the 200-foot level, and some 450 feet of cross-cutting and drifting was done on the former level. A large surface quarry, known as No. 1 quarry, was opened in ore well up the side of the *Mother Lode* hill; a tunnel—No. 2 quarry—was driven 170 feet at a lower level, and connection made between this and the floor of No. 1 by means of a raise, and still lower down workings known as No. 3 quarry were carried 200 feet into the hill, and from them a raise made to No. 2, the depth from No. 1 to No. 3 being 110 feet. In preparation for a materially increased output from the quarries, which last year contributed about 45,000 tons of the mine's total output, a larger rock crusher than that hitherto in use here, equal to crushing to a size not exceeding 5 to 6 inches 800 tons of rock per day of ten hours, has been obtained and is now being installed. This crusher is the largest in the District, and the first of its kind brought in. It is a Farrel crusher, made by the Jenckes Machine Company. The 35-drill improved cross compound condensing Corliss-valve Ingersoll-Sergeant air compressor, the 300 horse-power double cylinder Corliss-valve first motion hoisting engine, made by the Jenckes Company, the Robins belt conveying plant, and the 250-light dynamo, all ordered in 1900 and in course of installation at the close of that year, were completed and in running order early last year, since when they have worked smoothly and satisfactorily. Lately a machine shop was equipped at the mine. Building improvements made during the year include a large general merchandise store, new blacksmith shop, shaft houses, new ore bins, giving an additional ore storage capacity of about 500 tons, and several cottages for married employees. The outside surface works are lighted at night by electric arc lamps.

By next March this mine will have to be in shape to ship from 700 to 800 tons of ore per diem, since the provision of a second furnace, now being put in at the company's smelter at Greenwood, will necessitate production of at least that quantity of ore should there not be a sufficient quantity of custom ores available to lessen the quantity required from the *Mother Lode* mine. Mention was omitted above of the fact that a comparatively large quantity of ore, estimated at about 30,000 tons, in addition to that sent to the surface and shipped to the smelter, was broken down last year and remains in the stopes for later use. This quantity, added to that shipped by this mine, makes its total ore production for last year about 130,000 tons.

Sunset and Crown Silver.

At the Montreal & Boston Copper Company's *Sunset* and *Crown Silver* mines operations have been continuous throughout the year. Information supplied by the mine's office is that in the *Sunset* 193 feet of sinking and raising and 483 feet of cross-cutting and drifting was done in 1901, and 402 feet of cross-cutting and drifting in the *Crown Silver*, this work bringing the total number of lineal feet done in development up to January 1st, inst., to 1,516. A large body of ore was last year opened up near the surface and 800 tons shipped to the smelter. Several cross-cuts from the underground levels ran into ore, and the mine is reported to now be equal to maintaining a considerable daily output. An electric light plant was lately installed, and a Jenckes double cylinder, double drum, link-motion hoisting engine is now being substituted for the 80 horse-power hoist heretofore in use. A new bunk-house, 26 x 48, and two-story boarding-house, 30 x 50, were erected, and ore bins with a holding capacity of 2,000 tons, tramway, and other improvements made. A railway spur has also been constructed, to facilitate the shipment of ore. There were 56 men on the pay-roll at the end of the year. The Montreal & Boston Copper Company, organised last year with a nominal capital of $3,000,000, is reported in American mining journals to have lately been pushing sale of its stock in New York, Boston and Philadelphia. Among other statements recently published in New York are these: that the Company recently purchased a smelter, and that on November 1st it had $79,834 cash in the bank.

Morrison Mine.

No particulars of work done on the Morrison mine are just now available to the writer, but a mining engineer's report made at the close of last May gave the total quantity of underground cross-cutting and drifting at that time as 2,175 feet, and of sinking and raising as 375 feet, together 2,550 feet. There were, besides, some 600 feet of surface cuts, varying in depth from 5 feet to 15 feet. Development work has been continuously in progress since that date, and the diamond drill has been in use prospecting at the lower level, it is stated with good results, an ore body having been located from what is known as the 300-foot level. An 80 h.p. horizontal return tubular boiler, a No. 7 Cameron sinking pump, and another machine drill were added to the plant last year. A contract was made during the year for the Standard Pyritic Smelting Company to mine and smelt a large quantity of *Morrison* ore, but that company withdrew from its engagement. The directors of the Morrison Mines, Ltd., lately announced that an agreement had been entered into to sell the mine to Chicago and New York capitalists for

$185,000, upon terms, but the purchasers are not to take possession until after they shall have paid $85,000 of the purchase money.

Other properties in this camp upon which development work was done during the year were the *Great Hopes*, *Marguerite*, *Greyhound* and *Ah There*, but the results were unimportant.

LONG LAKE CAMP.

Jewel.

Recent development work on the *Jewel* situate in Long Lake camp, and owned by the Jewel Gold Mines, Ltd., of London, England, have considerably enhanced the value of that property. Particulars of work done have not been received, but it is known that during the past year a long tunnel was driven at the 230-foot level of the main workings of this mine, with several cross-cuts, in search at that depth of what is known as the north-east ledge, on which an incline prospect shaft was simultaneously sunk to a depth of about 150 feet. Owing to the marked difference in altitude, the prospect shaft having been started at a point much higher up the hill than the mouth of the *Jewel* main shaft, there must still be quite 300 feet of unexplored ground between the bottom of the prospect shaft and the level of the drive below, so that it has yet to be decided whether or not the north-east ledge continues with depth, which, from its general appearance and characteristics, it is believed to do. One unlooked-for result was achieved, viz., the striking in one of the cross-cuts of what is probably an extension of the main *Jewel* ledge, which previously appeared to have been cut off and separated from the north-east ledge by a 300-foot dyke or cross-fault of porphyry. At the 330-foot level of the old workings a body of ore, of generally higher grade than that occurring in quantity in other parts of the mine, was encountered. Late in the year work was practically suspended in this mine, but after a brief period instructions were received to resume operations. A 5 x 5 Bacon hoisting engine was the chief addition to the mine plant, that and a gallows frame having been required in connection with sinking the prospect shaft, power for the drills having been supplied from the air compressor at the main shaft. During 1901 the *Jewel* sent 325 tons of gold-quartz ore to district smelters, this quantity bringing its total output, shipped, to 485 tons. Altogether some 3,000 feet of work have been done in development of this mine.

Ethiopia.

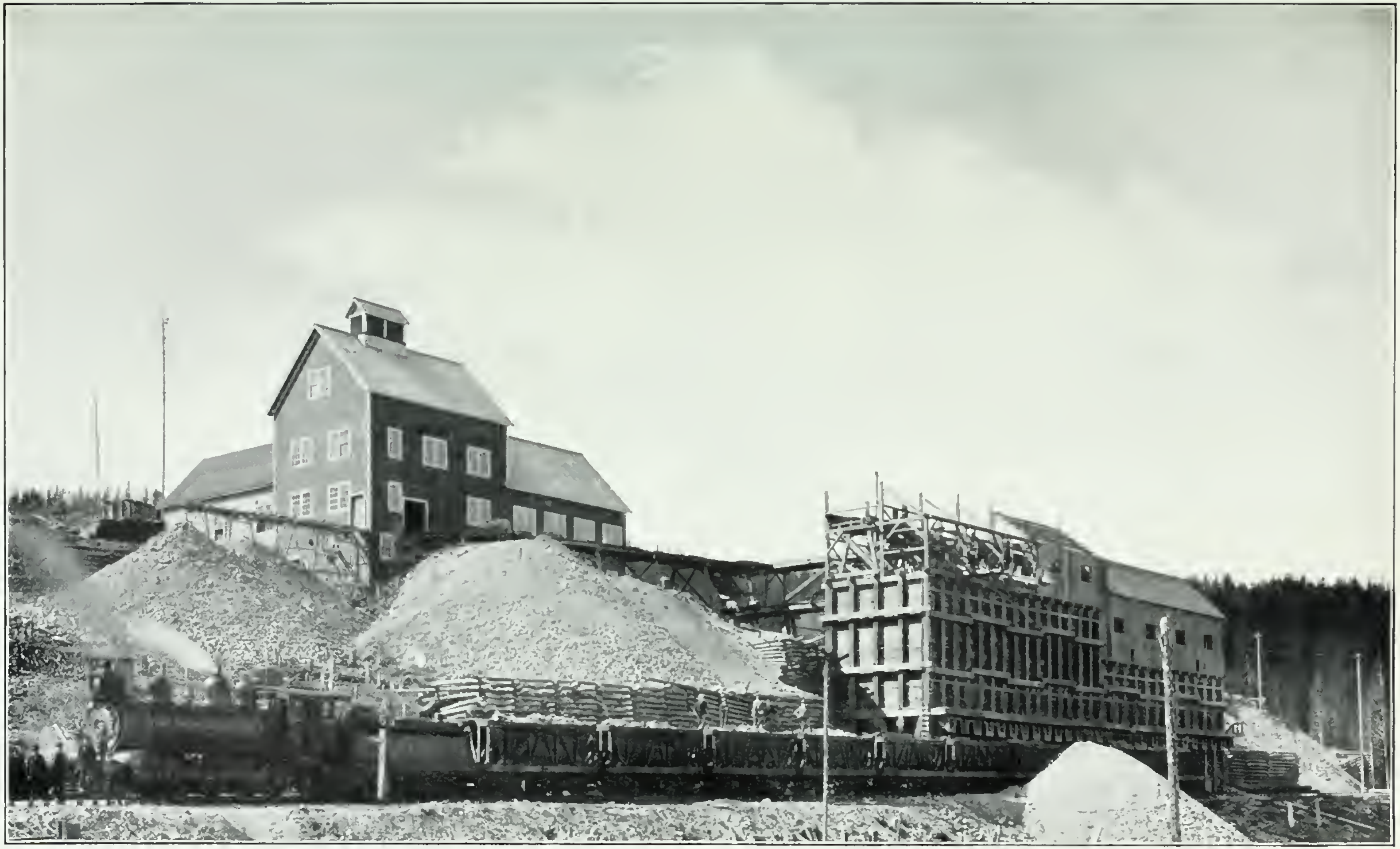
The *Ethiopia*, in the same camp, was further prospected, chiefly by surface cuts, and a short time since a test car of ore was sent to the smelter. It is not unlikely that this property, upon which some 300 feet of underground cross-cutting and drifting have been done, will be extensively opened up during 1902.

No work worth mentioning was done during the year on the Long Lake claims, of which the best known, besides those already named, are the *North Star*, *Enterprise* and *Lakeview*.

CENTRAL CAMP.

No. 7.

The *No. 7*, owned by the No. 7 Mining Company, Ltd., of New York, is the only property in Central camp that was at work last year. A power plant, consisting of a Class A Ingersoll-Sergeant straight-line air compressor rated at 5 drill, 6 one-man machine drills, air receiver, 100 horse-power boiler, 25 horse-power hoisting engine and a Cameron sinking pump, were started at work in the spring, and since then more progress has been made towards developing this mine. What was formerly a 4 x 5 prospect shaft, 130 feet in depth, was first enlarged to a double compartment working shaft, each compartment 4½ x 5 in the clear, and lately this shaft was deepened to 230 feet, and well timbered to the 200-foot level, at which a cross-cut was run to the ledge, which was cut at 40 feet from the shaft. The cost of deepening the shaft was unusually low—$18 per foot, including timbering. Drifts east and west of the shaft have been run at the 60-foot and 120-



OLD IRONSIDES SHAFT-HOUSE AND BINS, PHŒNIX.

foot levels, the former in all about 440 feet, and the latter 450 feet. A raise was also made from the 60-foot level to the surface. The year's development included about 200 feet of sinking and raising and 350 feet of cross-cutting and drifting, the total footage of underground work now being about 1,350 feet. The quartz ore occurring here varies in width from 18 inches to 7 feet, and it is mineralised with gold, silver, lead and zinc. Several stopes have been started, and in one of them a fortnight ago a 3-foot chute of the highest-grade ore yet found in the mine was encountered. The three months last past have been most unfavourable for shipping ore, for first the frequent rains late in the fall made the roads too soft to admit of heavy hauling, and again the winter had not brought sufficient snow for sleighing until this week of writing, so that latterly it has not been practicable to get the ore from the mine to the smelter. Altogether about 665 tons of ore have been hauled down to a siding between Boundary Falls and Greenwood, and taken thence by rail to the B. C. Copper Company's smelter. The question of transportation of ore from this mine is a difficult one to solve, since it is not likely that a branch railway will run anywhere near the mine, not at any rate while its operations are on a small scale; the desirability of putting in a concentrator is therefore under consideration, tests of the ore being meanwhile made to ascertain its suitability or otherwise for such treatment. Now copper values are low, the few gold-quartz mines there are in the District are attracting more attention. The number of men employed at the No. 7 has been 17 to 20.

Copper Camp.

For the first time Copper camp was last year represented by a shipping property, the *King Solomon* having, last summer and fall, sent down 850 tons of fair grade copper ore. Before winter set in work was stopped and the camp is again without a working representative.

Smith's Camp.

Ruby Mine.

The only claim at work in Smith's camp is the *Ruby*, which is under bond to parties from Detroit, Michigan, who are not losing any time in prospecting it. After doing a lot of surface work and uncovering several chutes of good copper-gold ore, two tunnels were started, one of which is in 163 feet and the other, at a vertical depth below the first one of 150 feet, is in 60 feet. A 45 horse-power boiler and two steam rock-drills are in use, and a boarding house has been erected, but little expenditure upon plant and buildings is being made until more is known of the prospects of the property, on which 15 men are employed. Altogether about 550 feet of work have been done in prospecting workings and 85 tons of ore have been sent to the smelter.

Skylark Camp.

Lake Claim.

The *Lake* claim, in Skylark camp, has been worked nearly all the year. A 60 horse-power boiler, 6¼ by 8 hoist, No. 5 Cameron sinking pump, steam machine-drill, and other appliances were installed, and a shaft was sunk for about 150 feet, meeting with ore most of the way down. Last week work was stopped, the reason not yet having been made public.

Kettle River Tributaries.

A small local company was organised last spring to work Rock creek by what is known as the "booming" system of placer mining, but the season closed without success having been attained. Next season another effort is to be made to get down to bedrock by this method.

Main Kettle River.

The *Riverside Group*, on the main river above Rock creek, has for some months been in the hands of mining men from south of the line, who sent out ore for a smelter test. Canyon creek and neighbouring tributaries of Kettle river appear to have been almost, if not quite, neglected for some time past.

WEST FORK OF KETTLE RIVER.

On the west fork of Kettle river a slight impetus was given to prospecting by the *Carmi* having had hauled on sleighs to Midway, and sent thence by rail to the smelter, 885 tons of ore, which is generally understood to have returned a fair profit above the high cost of transportation. The *Rambler*, in the same part of the district, has two or three carloads of ore awaiting snow to allow of its being hauled out. This ore is believed to run high in silver, besides having gold values. The *Butcher Boy*, on an extension of the *Carmi* lead, is reported to be looking well. Other promising claims in that neighbourhood are the *Sallie*, *Bell*, *Bounty*, *Idaho* and *Washington*.

GENERAL REMARKS.

The experience of the past year seems to have emphasised very sharply the necessity for working both mines and smelters on a large scale, particularly since copper values are so much lower now than some time since. Among several suggested consolidations was that of the interests of the B. C. Copper Company's *Mother Lode*, the Dominion Copper Company's *Brooklyn and Stemwinder Group* and the *Snowshoe*, and for a while it seemed possible that this might be brought about. The great fall in copper, however, interfered with the negotiations, which are now stated to be suspended for a while. There is much published about the very low grade of the general run of "Boundary" ores, but the compensations that exist are far less frequently mentioned. The chief offsets to the admitted low grade of much of the ore are its occurrence in enormous masses, the consequent cheapness with which it can be mined, and its remarkable self-fluxing properties which make it practicable to smelt it at much lower rates than is possible where ores are more or less refractory. As additional factors in building up a great mining and smelting industry in the "Boundary," mining costs must be reduced to as low a figure as is possible, and freight and fuel charges must also come down. Given these aids to turning the very extensive mineral resources of the district to profitable account, and there will be established here an industry that will eventually attain to proportions that will contribute largely to the commercial and industrial prosperity of a large section of the Province.

THE BRITISH COLUMBIA COPPER COMPANY'S SMELTER.

NOTE BY PROVINCIAL MINERALOGIST.—The following information has been received from Mr. Paul Johnson, E. M., Manager of the B. C. Copper Co.'s Smelter, at Greenwood:—

"The smelter commenced operations on the 18th February, 1901, with one blast furnace, 42 by 150 inches at tuyeres. This was kept in blast till the 22nd of August, when it was shut down nine days for repairs, and started up again on the 31st August, since when it has been continuously in blast. During the time from February 18th to December 31st, 1901, in this one furnace, 117,077 tons of ore were smelted and 3,714 tons of matte, assaying from 45 % to 60 % in copper, from 2 to 6 oz. in gold, and from 10 to 30 oz, in silver were produced. Besides *Mother Lode* and *Boundary* ores, there have been smelted some gold quartz ores of 80 % to 90 % silica, utilising the basic character of the *Mother Lode* ore. The largest tonnage was put through during the month of December, when 13,098 tons of ore were smelted, thus averaging for the entire month, for every 24 hours, 422½ tons of ore. The largest tonnage smelted in one single day was on January 10th, 1902, when the furnace put through 459 tons of ore. To handle this amount of material, and to break up and pile the matte produced (the work of the Blast Furnace Department proper) in 24 hours, 29 men were employed, viz.: 6 charge wheelers, 4 coke wheelers, 9 feeders (on 8-hour shifts), 2 charge weighers, 2 furnace men, 2 matte tappers, 2 roustabouts and 2 foremen; thus, during December 14½ tons of ore were handled per man per day. Counting the total force of the smelter, the sample mill requires 10 men for unloading and crushing ore, sampling and distributing same into ore mixtures, and loading the shipping matte, engineers, foremen, 1 blacksmith with a helper, 1 carpenter, besides 8 more men, making the total number of men employed, including foremen, 47, which at 422.5 tons of ore put through daily, makes 9 tons of ore handled and smelted for every man employed, which I believe is a record.

"As for the character of the *Mother Lode* ore, it may be classified into limy, irony and sulphur ores, and it is desirable for the smelting to have reserves of these different kinds to help out at times, when in the daily tonnage from the mine too much of one or the other sort is on hand. I give below the assay and analysis of three large lots of these different ores:—

a. Sample of Irony ore from 1,000 tons lot.
b. " Limy " 1,600 "
c. " Sulphur " 120 "

	a. Irony ore.	*b*. Limy ore.	*c*. Sulphur ore.
Copper....................	2.8 %	2.2 %	2.7 %
Gold......................	0.11 ozs.	0.09 ozs.	0.15 ozs.
Silver......	0.58 "	0.48 "	0.43 "
Insoluble.....	28.7 %	35.2 %	29.8 %
Fused Silica...............	16.9 "	29.2 "	24.5 "
Iron	32.7 "	14.7 "	17.5 "
Lime......................	5.6 "	19.8 "	16.0 "
Sulphur...................	3.7 "	5.3 "	13.7 "

"The character of these ores is not only self-fluxing but at times rather basic. I have therefore sometimes smelted to advantage as much as 5 % to 6 % of straight quartz ores with them.

"Before starting up the furnace, I had my doubts whether I could make higher grade matte than 30 to 35 % copper, without resorting to roasting the ore, but I found by actual practice, what I had hoped, that the irony variety, which is magnetic oxide of iron (Fe_3O_4), in smelting and reducing its iron to Fe_3O_3 for the slag, gives off 1 atom of oxygen for every molecule of Fe_3O_4, and this oxygen acts as a powerful desulphurizer, so that I have, in fact, burned off as much as 85 % to 90 % of the sulphur in the charge at times. I have aimed at making a 45 % to 50 copper matte, but sometimes it has come out as high as over 60 % copper, through having had rather much of the irony ore in the charge. I may mention, in connection with making this high grade copper matte, an interesting fact, viz.: that whenever the matte begins to come up to 53 % copper and above, the gold will "lock up" in the furnace in the metallic copper bottoms which form. One week when making 58 % to 63 % copper matte I had gold locked up to the value of $6,000 in the furnace bottom; the next week I had sulphur ores with which I could get the matte down to 45 % copper, and I then got all the gold out in five days. Silver does not behave in this way.

"The *Mother Lode* ore is exceptionally free from arsenic and antimony and behaves quite differently to certain other British Columbia ores which carry quite an amount of these metals and in running which I have found metallic copper and speiss separate out as soon as the matte came up to 47 %, causing much trouble in filling up the tap-hole and threatening in this way to plug up the furnace. To obviate this I have found it necessary, elsewhere, to change the trapped spot to the ordinary way of stopping up the tap-hole with clay and when the bottom was rising up inside the tap-jacket I used to blow the furnace for five minutes and the blast, following through, melted the gathering metallics and speiss. With the *Mother Lode* ore, however, I have made as high as 67 % copper matte in the blast furnace, using a trapped blast, without filling the tap-hole with metallic copper.

"For its size (42 inches by 150 inches at tuyeres), I think this furnace has the best record so far for large tonnage and at the same time cleanness of slags made. The coarseness of the ore has a great deal to do with tonnage, and to some extent clean slags, as was discovered when we began to crush it to a 5-inch size, instead of from 2 to 3 inches as at first. A couple of per cent. of silica, more or less, in the slag does not slacken these big furnaces up as quickly as it does smaller ones; neither is high lime as bad. What I have found troublesome, raising the copper in the slag, and making it heavy with a poor separation of the matte, is when the iron in the slag comes up to 30 % and 32 %, and silica at the same time is low, say 28 % to 30 %.

"I give below examples of some different kinds of slags made, with the corresponding tonnage.

"Nov. 7th, 1900—Slag:—SiO_2 = 42.7 %; Fe, 21.1 %; CaO = 20.0 %, and Cu 0.33 %; matte, 44 % Cu; furnace smelted 393 tons of ore.

"April 1st, 1901—Slag:—SiO_2 = 33.8 %; Fe = 25.4 %; CaO = 25.7 %, and Cu = 0.25 %; matte went 49 % Cu; tonnage 402 tons of ore; high lime has a tendency to make the slags free from Cu.

"July 7th, 1901—Slag:—SiO_2 = 30.9 %; Fe = 32.5 %; CaO = 16.8 %; Cu = 0.44 %; matte, 53 % Cu; tonnage, 399 tons.

"January 10th, 1902, (when the furnace put through 459 tons of ore) slag:—SiO_2 = 37.8 %; Fe = 24.5 %; CaO = 20.9 %, and Cu = 0.35 %; matte, 49 % Cu.

"We make slag assays for copper twice a day, but do not make it by the generally-adopted colorimetric method, which, as a rule, gives too low results and deceives the metallurgist, making him believe and tell others that he makes cleaner slags than he does. The slag samples are taken every hour, chilled in water, and the day and night shifts kept apart. Two grammes are taken for the determination, dissolved in hydronitro-chloric acid evaporated with H_2SO_4 diluted, and the copper precipitated with hyposulphite of sodium solution; the Cu_2S is dissolved in HNO_3 and titrated with KCy; this determination takes somewhat over two hours, but it is correct and reliable, and it will check, as I have proved, to one hundredth of one per cent. (0.01 %) of copper. Where you have very little copper in your charge it is important to have accurate determinations of your slags, and to keep them low in copper, as 0.1 of one per cent. makes quite an item. These daily slags are then put together, and once weekly an average assay of them all is made for gold, silver and copper. The slags, as a rule, have been very clean, as follows:—

"Copper, varying	between 0.30	and	0.037	per cent.
"Gold,	„ 0.0025	„	0.0035	ozs.
"Silver,	„ 0.04	„	0.07	„

"Of course more copper in the slag is allowable in making 50 % Cu matte, than in making 30 % Cu matte. Formerly it used to be considered good smelting to have only 0.1 per cent. copper in the slag for every 10 per cent. copper in the matte; thus in making 30 % Cu matte, 0.3 % Cu in the slag was permissible, and so forth.

"The amount of coke used is from 11½ per cent. to 12 per cent. of the weight of the ore. The blast used is from a No. 7½ Connersville Blower making 155 revolutions per minute and giving 80 cubic feet of air per revolution. The blast pressure averages 1¾-inch mercury, equal to 14 ounces.

"The feed height above the tuyeres varies from 4 to 8 feet, when little sulphur or much coarse ore, feeding high; when much sulphur or much fine ore, feeding low. The best feed-height, for good running, I have found to be from 7 to 8 feet.

"As to the running of the furnace, charges of 3 tons are put in at the feed floor by feeders and not by any mechanical devices which, as I have had occasion to find out, do not pay, but cost a great deal of money and give a bad working furnace and dirtier slags.

"A charge comes down to the tuyeres in three-quarters of an hour. Slag and matte run together continuously through a trapped spout into a water-jacketed forehearth on wheels, inside dimensions being 8 feet long by 5½ feet wide by 3 feet deep. The matte, having a specific gravity of 5 to 5.3, sinks to the bottom, and the slag, of a specific gravity of about 3.4 to 3.5, overflows at the furthest end into a large settling pot, and from this into the granulating flume. The matte is tapped at intervals into matte pots, the contents of which are poured into matte-moulds, 2 feet wide by 5 feet long by 4 inches deep, thus cooling off the matte quickly, and delivering it into the shape of cakes 1 to 1½ inches thick. These matte cakes, when cooled, are knocked on the top with sledge hammers and broken up into 3 to 5-inch pieces, and are shipped in this way in bulk into box cars, the lots averaging 30 tons. This does away with a crusher and sacking, and makes the matte pots last longer.

"*Enlargement of the Plant.* We have, during the latter part of 1901, been at work to double the capacity of the smelter, and to this end erected new sets of lower ore bins, 12 in number, with an increased storage capacity of 5,000 tons, making a total storage capacity for the lower ore bins of 10,000 tons. Another large 560 feet long railroad trestle has been built between the two previous ones in order to facilitate and make possible the handling of over 1,000 tons daily of material for the smelter by the railroad. The foundations for the furnace building extension and the new second furnace are in, and cast iron columns and deck-plates for the new second furnace have been put up. The furnace will be finished as soon as the weather allows the putting up of the brickwork for it. The new 7½ Connersville Blower is ready and in place for the furnace. With this second furnace completed, the plant will have a daily capacity of over 800 tons of ore, and together with coke and coal and matte the railroad will have to handle nearly 1,000 tons daily.

"We figure on getting eventually three to four furnaces going, and shall then add converter works for making the matte into blister copper."

OFFICE STATISTICS, KETTLE RIVER MINING DIVISION.

Number of free miners' certificates issued	1,079
" special "	3
" locations	718
" " placer	12
" leases "	23
" certificates of work	959
" conveyances	317
" certificates of improvements	40
" abandonments	27
" letters of administration	1
" water grants	3

Revenue Collected.

Free miners' certificates	$ 5,955
Mining receipts	6,748 05
Total	$12,703 05

GRAND FORKS MINING DIVISION

REPORT OF S. R. ALMOND, GOLD COMMISSIONER.

I have the honour to submit my report of mining operations in the Grand Forks Mining Division during the year 1901.

This division comprises the drainage area of the north fork of Kettle river and that of the main Kettle river from where the latter crosses the International boundary line at Carson, to where, below Cascade City, it re-crosses into the United States, together with the drainage area of Christina lake, the south end of which lies about two miles northerly of Cascade City. The country is fairly accessible, the mountain ranges not rising much over 3,000 feet above the valley bottoms. The summits and northern slopes of these mountain ranges are invariably covered with timber, whilst the slopes having a southerly view are mostly free from timber and covered with grass. The rock formation of this district is said to be highly metamorphosed and to consist of gneisses, schists, quartzites and slates, together with crystalline limestones and eruptive rocks of various kinds. Work in the different camps during the past year has been steady but not vigorous, owing, I presume, to the somewhat tardy investment of capital.

CENTRAL (OR WHITE'S) CAMP.

This camp lies at an elevation of between 4,000 and 5,000 feet. It is situated just north of the International Boundary line and about 13 miles west of Grand Forks. The formation is a light greenish schistose rock cut by dykes trending north-west and south-east. The principal claims in that part of Central camp which is in this Mining Division are the *City of Paris*, *Majestic*, *Lincoln*, *St. Maurice*, *St. Lawrence*, *New Jack of Spades*, *Lexington*, *City of London*, *Alena* and *Excelsior*.

The City of Paris Gold Mining and Milling Company stoped and shipped about 150 tons of ore from the *City of Paris*, but did not do any development work this year. The work done in this mine consists of 370 feet of sinking, 5,184 feet of tunnels, drifts and cross-cuts, and 700 feet of upraising.

The Majestic Gold Mining Company has done no work during the past year. The total development in tunnels, drifts and cross-cuts, all told, is 1,178 feet.

WELLINGTON AND GREENWOOD CAMPS.

These camps lie on the summit, at an altitude of between 4,000 and 5,000 feet, between Fourth of July and Boundary creeks, and are adjacent one to the other. Large bodies of magnetite, from which the Granby smelter obtains the bulk of its iron ore, are to be found in this camp. The most developed mines in the Grand Forks section of this camp are the *Winnipeg*, *Golden Crown*, *Snowshoe*, *Gold Drop*, *Rawhide*, *Athelstan*, *Hard Cash*, *Evening Star* and *Hartford*.

Golden Crown.

The *Golden Crown*, owned by the Brandon and Golden Crown Mining Company, has been closed down during the past year, but at the present time is being put into shape to start work again. Over 500 feet of sinking and raising and nearly 2,000 feet of drifting and cross-cutting comprise the work done. All necessary machinery has been installed.

Winnipeg Mine.

The *Winnipeg*, owned by the Winnipeg M. & S. Co., has been worked throughout the past year and ore has been shipped to the smelter. This is the most developed mine in Wellington camp, having nearly 1,000 feet of sinking and raising, and 3,000 feet of drifting and cross-cutting done, but of the amount of work performed in the past season I have no summary. The mine is furnished with all the requisite machinery.

Snowshoe.

The *Snowshoe* is now owned by the Snowshoe Gold & Copper Mines, Limited, of England, a company having a capital of £250,000, organised in London last summer by the management of the British Columbia (Rossland & Slocan) Syndicate, Limited, which had previously done sufficient prospecting to warrant it in forming the separate company to acquire and operate the *Snowshoe*. The development work done during the year included 590 feet of sinking and raising and 1,542 feet of cross-cutting and drifting, making together 2,132 feet for the year. Work done at this mine prior to 1901 consisted of 602 feet of sinking and raising and 2,266 feet of cross-cutting and drifting, the total footage to end of 1901 being 5,000 feet. Considerable prospecting was also done underground with the diamond drill, besides which a large area of surface was stripped, exposing an extensive body of ore ready for extraction by quarrying it, or otherwise mining it at low cost. Some of the ore taken out as development proceeded was sent to the smelter, generally as test shipments to ascertain bulk values of ore taken from different parts of the mine. In this way 1,731 tons in all were shipped to the smelter. The first half of a Rand-Corliss 30-drill air compressor, to have a working pressure of 125 lbs., a combined machine to be driven by either steam or electricity, and two 80 horse-power horizontal return tubular boilers with a working pressure of 150 lbs., have been ordered for this mine from the Jenckes Machine Company. The air end of the compressor is to be fitted with Corliss valves, similar to the machines at the Le Roi, Nickel Plate and Centre Star mines at Rossland. The boilers will be the first of that class brought into the "Boundary." Building improvements made during the year were the erection of a two-story bunk house, boarding-house, offices, superintendent's cottage, foreman's cottage, ore bins, powder-house, and water tanks. A pipe-line was laid to the buildings, a road made to the powder-house and other parts of the property, a railroad switch and siding put in, &c. The average number of men employed at this mine during the year was 35. Mr. J. W. Astley has been appointed superintendent and now resides on the property.

Gold Drop.

This is the adjoining property to the *Snowshoe*, lying west of the latter. The diamond drill was successfully used on this claim, and the surface showings are extensive. The work done comprises over 400 feet of sinking and raising, and nearly 2,000 feet of drifting and cross-cutting.

The *Rawhide* lies south of the above-mentioned claims. The work done amounts to 100 or so feet of sinking and raising, and about 500 feet of drifting and cross-cutting.

The *Athelstone*, owned by the Athelstone Gold Mining Company, has been closed down most of the past season, although in the early part of the year it was shipping ore. The mine has a small plant of machinery, and about 300 feet of sinking and raising and about 200 feet of drifting and cross-cutting have been done.

The *Hartford*, owned by the Hartford Gold Mining Company, has remained idle since September, 1900. About 200 feet of sinking and about 150 feet of cross-cutting and drifting have been done. Adjoining the *Hartford* is the *J. & R.*, owned by John Rogers and H. Jones. There are 75 feet of shafting and cross-cutting, and a body of 4 feet of ore has been developed for 47 feet.

The above-mentioned properties are all Crown-granted.

SUMMIT CAMP.

This camp is on the headwaters of Fisherman creek and contains many claims of great promise besides several shipping mines.

B. C.

The *B. C. Group* comprises eleven mineral claims owned by the B. C. Chartered Company. The bulk of the development has been done on the *B. C.*, and consists of about 2,000 feet of sinking and raising, and about 6,000 feet of drifting and cross-cutting. A diamond drill has been used lately for further prospecting. This mine has been a constant shipper throughout the year. The ore is copper pyrites and pyrrhotite, and the property is well equipped with power plants and machinery.

The *R. Bell*, owned by the Granby Smelting Company, has been shipping ore during the past year, and consequently has had some development done, but to what extent I an unable to state. The work so far recorded on the claim is about 400 feet of sinking and 600 feet of cross-cutting and drifting. A small power plant has been installed.

On the *Oro Denero* the amount of work done consists of over 200 feet of sinking and 800 feet of cross-cutting and drifting. The plant of the *Oro Denero* includes boiler, air compressor, machine drills, hoisting engine and steam pump.

Blue Bell.

This claim, owned by Messrs. Shaw, Stark and McDonald, was bonded to a Company of Chicago men, but apparently the bond has been relinquished, although I understand the claim has excellent showings. The work done in the past year comprises a double compartment shaft, 130 feet deep and well-timbered, 90 feet of drifting at the 100-foot level and 30 feet of drifting at the 130-foot level.

On the *Emma*, *Maple Leaf* and *Mountain View* the amount of work done varies from 100 to 200 feet of shafting, and from 200 feet to 500 feet of drifting and cross-cutting on each property. The *Cordick*, *Minnie Moor*, *Wake*, *Jumbo*, *Mountain Rose*, *Mattie Davis* and *Josie* are other promising properties in Summit camp.

Orleans, *Senator*, *Freemont* and *Brooklyn*. On each of these claims about 100 feet of prospecting work has been done, mostly in shafts, and the showings are very encouraging.

Josie and *Josie Fraction*. The work done on this property consists of a shaft 111 feet deep with a drift of 86 feet and a cross-cutting of 64 feet to a parallel lead at the 100-foot level.

The *Royal Banner Group* consists of four claims on which a shaft 85 feet deep with a 12-foot drift at the bottom, and a second shaft 16 feet deep, together with several open cuts, have been made. On the *Alpha*, *Omega*, *Horseshoe* and *Ophir*, shafts and cross-cuts in the way of prospecting have been made.

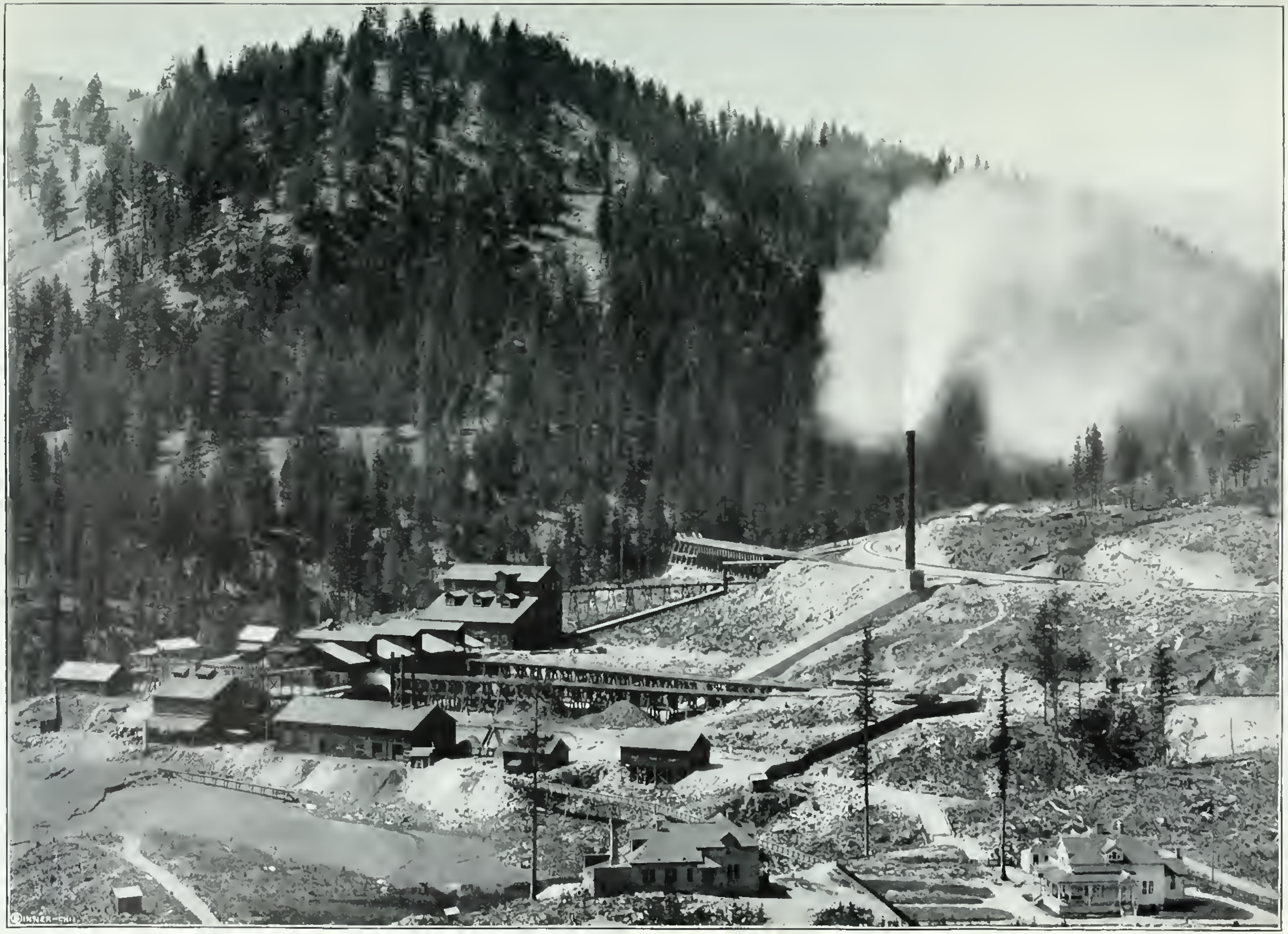
BROWN'S CAMP.

Brown's camp is situate on the north fork of the Kettle river, about 9 or 10 miles northerly from the town of Grand Forks. The most progressive claims in this camp are the *Pathfinder*, *Little Bertha*, *Golden Eagle*, *Volcanic*, *Humming Bird*, *Strawberry* and *Seattle*.

Pathfinder.

On this property, owned by the Pathfinder Mining, Reduction and Investment Co., Ltd., there are four distinct leads, occupying almost parallel fissures along a main fracture and within close proximity to each other. A closer relationship between these veins may be determined by further exploration. The work done on the *Pathfinder* consists of 337 feet of shaft and about 750 feet of tunnelling. There are good showings on all the veins and considerable exploration work has been done. "No. 1" shows a strong outcrop for 120 feet, and at the 50-foot level has a width of 12½ feet. The average value of the ore is about $17 per ton.

The machinery at the mine consists of a 50 horse-power boiler, a 16 by 24 straight-line air compressor, air receiver, 2 machine drills, 6 by 8 hoisting engine with pumps, etc. The ore bodies are of pyrrhotite carrying gold, silver and copper values. Work for the present year



B. C. COPPER Co.'s SMELTER—GREENWOOD-KETTLE RIVER MINING DIVISION.

comprises 30 feet of shaft, 25 feet of cross-cutting and 45 feet of drifting. The mine was closed down through the summer months but is now working again.

The *Humming Bird* (Humming Bird (B. C.) Gold Mines, Ltd.) was leased last year by Messrs. Shannon and Layeux, who have worked the property continuously and have been shipping ore. They have advanced the tunnel about 40 feet, besides doing considerable stoping, and a total of about 500 feet of drifting and cross-cutting has been done.

Earthquake.

The *Earthquake* (Earthquake Consolidated Gold Mines Co., Limited) has been idle during the last year, but the work done prior to January, 1901, consisted of between 500 to 600 feet of shafts and tunnels. The deepest shaft is about 80 feet, and from this there are 600 or more tons of ore lying on the dump.

On the *Golden Eagle* between 200 and 300 feet of sinking and drifting have been done, but like other properties in this Division, it has lain idle for some time past. There is a small power plant on the claim.

On the *Volcanic* there are 700 or 800 feet of tunnelling, but no ore has yet been shipped. Work on the tunnel is still in progress at the time of writing.

The *Little Bertha* and *Strawberry* have both shipped ore, and have been considerably developed, but to what extent I am unable to say.

The *English and French Group* (E. & F. Gold Mining Company) comprises the *Bonanza*, *Colorado*, *Nevada*, *Mountain View* and three other claims. The principal work has been done on the *Bonanza*, and consists of two tunnels, one of 90 feet and one of 140 feet, and two shafts, one of 70 feet and one of 12 feet. There are also two other shafts of 30 and 25 feet respectively, and a tunnel of 40 feet.

The *Seattle*, with other adjoining claims, has lately passed into the Granby Smelter Co.'s hands.

The *Mono*, *Queen of the Hills*, *Accident*, *Maine*, *Viola*, *Belle Plain*, *Deer Park* and *Utica* (on Fisherman creek), each have about 100 feet of work done on them, in sinking, drifting and cross-cutting, and the *Niagara*, on Fisherman creek, has 46 feet of tunnelling and shafting.

On the *Herald* and *Richelieu* 20 feet of sinking have been done in the past year, the total work being 70 feet of sinking and 50 feet of tunnel.

On the *Golden* 10 feet of sinking was done during the past season, the total work being 60 feet of sinking and cross-cutting.

On the *Flying Cloud* (Pass creek) an open cut 30 feet long, 10 feet deep and 6 feet wide, has been made, and on the *Exchange*, on the same creek, the work consists of a shaft 20 feet deep, and a drift of 10 feet at the bottom of the shaft.

Hardy Mountain.

On this mountain a great deal of good work has been performed, but I am unable, at the present time, to give the details of what has been done on the principal properties.

The *Yankee Girl*, a mine that for some time shipped ore to the Granby smelter, has been shut down for nearly a year now.

On the *Homestake Group* of three claims there is a well-timbered shaft of 35 feet, a second shaft of 18 feet and several cross-cuts.

The *Iuka* has a shaft 40 feet deep with two drifts, besides several open cuts.

On the *May Queen* 30 feet of sinking and 10 feet of drifting have been done this year, the total development being 75 feet of sinking and 15 feet of drifting.

The *Layover* has 52 feet of open cutting, 8 feet deep, and a small shaft.

On the *Boone* a shaft 45 feet deep, and on the *Homestake* one of 25 feet, have been sunk. On the *Buller* and *Chicago* about the same amount of work has been done.

The *Rabbitt's Paw* has a 30-foot shaft and a tunnel 30 feet long; the *Last Chance* and *No. 7* have several open cuts and small shafts, and the *Majuba* has a tunnel of 140 feet, with a 9-foot cross-cut at 135 feet from the mouth, and a shaft 34 feet deep.

Among claims in the vicinity of the town of Grand Forks may be mentioned the *Lincoln*, *Riverview* and *Key*, which have two shafts of 17 and 15 feet respectively, a tunnel 168 feet long, a cross-cut of 20 feet and several open cuts; the *Montreal*, *Bijou* and *Rattler*, on which 40 feet of sinking have been done this past year, making a total of 190 feet of sinking altogether, and the *Republic* and *Oriole* on which 25 feet of sinking has been done during the season.

FRANKLIN CAMP.

The following is a summary of the work in this camp:—

Banner: Over 200 feet of tunnelling and considerable drifting and cross-cutting; small sample shipments (pack loads) made to the smelter.

McKinley: Considerable development work, but the details not obtainable.

Gloucester: 50-ft. shaft in solid ore. The lead is of considerable width, and has been traced for over 400 feet on the surface.

G. H.: 24-ft. shaft. The *Ophir* and *Pinto*, each a shaft of 20 feet. Of the *Pollard*, *Silver Bell*, *Homestake*, *Apex* and many other promising claims I am unable to give any particulars.

BURNT BASIN AND CHRISTINA LAKE.

Contact Group.

The Contact Consolidated Gold Mines, Ltd., owns the *Contact*, *Mother Lode*, *Ajax and Ajax Fraction*, *Daly*, *Glengarry*, *Mountain View* and *Mountain View Fraction.* The majority of work seems to have been done on the *Mother Lode.* No. 1 vein on this claim has been stripped for 125 feet and a shaft sunk on the lower portion to a depth of 50 feet. From the foot of this shaft a cross-cut tunnel has been driven for 60 feet, at which point the upper portion of the vein was cut, and proved to be 7 feet wide. This gave a depth of 95 feet on the dip of the vein. A cross-cut tunnel has been driven for 240 feet, cutting the same vein at a depth of 163 feet, at which point it is 4 feet in width. Work is being continued along this vein at the lowest level. The ore carries good values in gold and silver. A tunnel has been driven along vein No. 2 for a distance of 50 feet, and lower down the hill a second one has been driven, on the same vein, for 30 feet.

No. 3 vein has been stripped for 80 feet on the surface, and a cross-cut tunnel, which is now in 120 feet, is being driven to cut the lead at depth. There are numerous open cuts on different portions of the property.

Tammany Group.

The Tammany Gold Mines, Ltd., own 8 claims, comprising the *Tammany No. 1*, *Jim Blaine* and *Jim Blaine Fraction*, *Gold Nugget* and several others, all of which have had prospecting work done on them. The company has driven a tunnel on the *Tammany No. 1* for a distance of 130 feet; in running this, three quartz veins were cut through, two small ones and one of considerable width.

The British Columbia (Rossland & Slocan) Syndicate owns the *Daisy*, *Daisy Fraction*, *Martha May*, *Lizzie L.* and *Lizzie L. Fraction.* Considerable work has been done on some of these claims.

The work on the undermentioned properties is briefly:—

Eva Bell: Forty feet of sinking and cross-cutting.

Alhambra: Shaft of 40 feet on a good quartz showing.

John Bull: Over 150 feet of tunnelling and considerable cross-cutting.

Buckingham and *Orion*: Each about 20 feet of sinking. Some of the assays on samples taken from these claims go over 25 per cent. in copper.

Tin Cup: Shaft of 60 feet, in quartz all the way.

Ennismore (owned by the Avon M. & M. Co.): Tunnel driven 100 feet in quartz, and a shaft sunk 50 feet on a showing of galena.

Comart: About 40 feet of tunnel. The assays on this claim are said to run high.

There are other groups and many claims on which considerable work has been done, but I cannot obtain any data.

The following information was obtained from Mr. W. B. Townsend, of Rossland:—

"The Burnt Basin section of Grand Forks Mining Division has disclosed some of the best surface prospects in the country, but most of the claims are held by comparatively poor men, so that very little systematic development work has been done, the owners as a rule just doing sufficient each year to record an assessment. It will take deeper sinking to prove the properties, as the surface is broken up by volcanic action to such an extent that what indications have been worked upon do not give a feeling of certainty that they will prove to be permanent.

"Those claims which have had any quantity of work done upon them certainly offer great inducements to continue development. The property known as the *Contact* has a promising ledge, which has been developed to a depth of about 150 feet; this vein showed free gold at the surface, but is really a concentrating quartz.

"The *Tammany* property, which is now controlled by American capitalists, of Michigan, has also given satisfactory results for the work done. The *Mystery*, too, has an excellent showing for the development performed, but is closed down now for want of capital.

"The *Ennismore*, owned by the Avon Company, has also a good showing, work having been done upon a ledge of galena, which carries considerable zinc, and which appears to run through the *Plewman* property and the *Cooper*, *Halifax* and other claims.

"On the *Kittie*, the *Aldeen* and the *Tunnel Group* 5 years' assessment work has been done, and the certificates of improvement issued. The work has been carried on all over the property, and a shaft has been sunk for 20 feet on what appears to be a true fissure quartz vein, carrying free gold near the surface, but which no doubt will prove to be a concentrating proposition like the *Contact*, when depth is attained.

"The *Mecklenburg* property, owned by the Wallis-Haultain Syndicate, is Crown-granted and has good showings, but is lying idle at present. The *Snowdrift*, *London Prize*, *Big Find*, *Stollberg*, *Nordhausen*, *International* and *Silver Grey Fox* have all had work done upon them, with good results.

Comart.

"On the *Comart*, situated in what is known as the North Burnt Basin, there appears to be a large exposure of ore on the side of a precipice, and rich float, assaying over $100 to the ton, has been picked up. The owners, however, have done little development work.

"Transportation facilities are the chief requisite in this section."

GRAND FORKS SMELTER.

NOTE BY PROVINCIAL MINERALOGIST.—The following description of this plant and of the smelting operations during the past year has been furnished by Mr. A. C. Flumerfelt, General Manager of the Company:—

"The following is a summary of the operations of the Granby plant (two furnaces) from August, 1900, to December, 1901:—

Month 1900.	Tons.	Daily average. Tons.
August, 11 days	2,902	.....
September	8,753	291 ⅔
October	14,215	468 ¼
November	18,050	601 ⅔
December	18,467	595 ⅔
Total for 1900	62,387	
1901.		
January	17,640	569
February	17,708	632 ⅕
March	19,713	636
April	18,995	633 ⅙
May	19,075	615 ⅓
June	18,510	617
July	18,176	586 ⅓
August	18,028	581 ½
September	20,059	668 ⅔
October	20,347	656 ⅓
November	20,706	690 ⅕
December	21,971	708 ¾
Total for 1901	230,028	

"A gratifying feature is the increased effectiveness of treatment as compared with the showing during the first year. For instance, in November and December of 1900, the plant treated 36,517 tons of ore, giving a daily average for those two months of 598⅔ tons. During the corresponding months of 1901 the same two furnaces reduced 42,677 tons, or a daily average for those two months of 699⅔ tons—an increase of 101 tons daily. These figures refer to ore alone—no coke consumed in smelting is included, and no barren fluxes are used owing to the self-fluxing character of the ores.

"The plant has recently been enlarged by the addition of two furnaces and two sets of converters, the function of the latter being the conversion of matte into blister copper. The converter has been in operation since January 14, 1902, and is working satisfactorily. The new furnaces will be 'blown in' within the next few weeks, when the smelter will be in a position to treat an average of 1,500 tons of ore daily, and will make it the largest reduction works in Canada. Before giving a detailed description of the recent enlargement, it will be well to briefly describe the original plant.

"The water-power developed on the north fork of Kettle river gives 1,200 horse-power at extreme low water under an actual head of 45 feet. The dam gives about 30 feet of this head, the rest being made up between the dam and the power-house. The dam is 175 feet across the top, 75 feet from heel to toe on the bottom, built out of 12 by 12-inch sawn timbers, filled in with rock and gravel. The flume is 12 by 9 feet, and a mile long.

"The power-house is within 1,000 feet of the smelter buildings and 100 feet below them. The power with which the blowers, sampling works, converter, etc., are driven, is created by three double 16-inch turbine water-wheels, operating under an effective head of 45 feet. These wheels are connected with the flume by steel intake pipes 4 feet 7 inches in diameter. Each is directly connected with one Westinghouse rotating arm, alternating current generator. Another wheel is belted to 2 pumps, each with a daily capacity of 750,000 gallons. These pumps furnish water and pressure to granulate the slag as it runs continuously from the furnaces.

"The power-house, as originally planned, was 100 feet long by 30 feet wide, all the batteries being set in line, on one long concrete foundation.

"The smelter proper consisted of two double-decked, steel-jacketed furnaces, 160 by 44 inches at the tuyeres, made by the Gates Works, of Chicago. The gases pass off from the top in a 4-foot diameter downtake pipe, which is connected with the big flue dust-chamber leading to the stack, the flue chamber being 10 by 10 feet on the inside and 300 feet in length. The stack is 11 by 11 feet inside measurement, and 152½ feet high. The blower room is 50 by 58 feet, and is 42 feet from the furnace building. It contains three blowers, one for each furnace and one in reserve. These are connected with the furnaces by a 54-inch diameter blast pipe, all blowers being connected with the one main pipe. Each of these blowers is driven by a 75 horse-power Westinghouse induction motor, which is belted directly to the blower.

"The original sampler building is 64 by 70 feet, and is surrounded on three sides by ore bins. The ore train, as it comes into the smelter, is carried on a trestle to a series of receiving bins, parallel to the front of the sampling works, 23 feet above the floor of the same and 33 feet distant. The bins are filled directly from the cars, which have a bottom dump. The ore is taken from the receiving bins by small iron cars, which dump into a No. 5 Gates gyratory crusher. This crusher has its opening a little below the floor of the sampling works and has a capacity of 1,000 tons daily. After the ore is crushed to the size of a 4-inch ring it is elevated to the top of the building by a continuous steel-bucket elevator. It is next sampled by a 60-inch Snyder automatic sampler. The bulk of the ore is distributed to the bins on three sides of the sampling works by a special cast-iron revolving spout.

"Behind the smelter and at an elevation of about 100 feet above the works is a 100,000-gallon tank, which is supplied with water through an 8-inch steel-riveted pipe extending from the pump to the power-house, a distance of about 2,000 feet from the tank. This water is used principally for granulating the slag as it runs continuously from the settler in front of the furnaces. All the machinery is run by Westinghouse induction motors. There is a 75 horse-power motor for the sampling works, a 30 horse-power motor for matte sampler, a 25 horse-power motor for the machine shops, and a 10 horse-power motor for the elevator in the main furnace building. This embraces a brief description of the old plant.

"The work of enlargement was started in May last. The power plant has been increased by a 250 horse-power horizontal turbine water-wheel and a 250 horse-power electric generator directly connected with the water-wheel, making a total of 250 horse-power developed for the use of the city of Grand Forks, the total water-power thus developed on the Kettle river being 1,100 horse-power. There have also been added two additional triplex power pumps, which will each supply another 750,000 gallons of water daily for granulating the slag and for the water jackets. The new pump was furnished by the Stilwell-Bierce-Smith-Vaile Co., of Dayton, Ohio. The Dayton Globe Works furnished the 250 horse-power water-wheel.

"The blower room has been increased by one No. 8 Connersville blower, making 4 in all, or one for each furnace. Two hundred feet have also been added to the dust flue. All the contracts for the supply of the motors and electrical plant were executed by the Westinghouse Electric & Manufacturing Co., of Pittsburg.

"The main furnace room has been enlarged an additional 84 by 82 feet. The two new furnaces, like the old ones, were built by the Gates Iron Works, Chicago. They are set 39 feet apart, centre to centre, and room is left for two more, which the company is likely to add sometime during the current year. Their actual capacity, in consequence of the self-fluxing character of the ores treated, has been found to be about 380 tons each daily.

"A new sampling and crushing plant has been built. It is 70 by 70 feet, and at its highest part it has a height of 65 feet. An additional No. 5 Gates crusher with automatic sampler, rolls, etc., has been installed. These additions will crush and sample 1,000 tons daily, making the total daily capacity of the crushing and sampling plant 2,000 tons daily. Additional ore bins have also been built. They will have a carrying capacity of 5,000 tons, and, with the existing bins, provide a total capacity of 10,000 tons.

"A briquetting plant of 100 tons daily capacity is being installed. Its function is to compress the flue dust into bricks, which will afterwards be re-smelted. The plant was built by the Henry Mould Co., of Pittsburg.

"The converter building is on the same level as the furnace house and 100 feet therefrom. It is a steel fire-proof structure 160 by 68 feet, its height in the main portion being 45 feet. The contract for its construction was executed by the Hamilton Bridge Co., of Hamilton, Ont. This building contains two stands of converters of the horizontal barrel type, supplied by the Gates Iron Works of Chicago. The shells are 72 inches in diameter by 100 inches in length. Each stand will have a capacity of from 50 to 70 tons of matte daily, and each is provided with three shells. This building also contains a 40-ton electric travelling crane, 40-foot span, for handling the shells and matte. In another portion of the building is a 25-ton reverberatory tilting furnace, also supplied by the Gates Iron Works.

"In the same structure there is the quartz crushing plant and grinding pan for mixing the converter linings. Under each converter stand are three mould carriers operated back and forth by a hydraulic ram. The converters are also tilted by hydraulic power as well as the reverberatory furnace. Near the converter building is the engine room, in which is the blowing engine for blowing the converters; also the hydraulic pump which furnishes the pressure to operate the various machines in the converter building.

"The blowing engine is run by a belt from a 200 horse-power alternating motor. It is of the power type, has an air cylinder 36 by 36 inches, and has a special unloading device attached, so that when the pressure reaches a maximum of 12 pounds the valves are so arranged that they remain open and no power is consumed while the converter is not using air. This unloading device was especially built for the Granby Co., and has hitherto never been used on any low-pressure blowing engine used for converter purposes.

"The converter building is connected with the furnace house by a 10-ton electric crane, 24-foot span. The matte from the furnaces is first settled in receivers, which in turn are tapped out into the matte ladles.

"The small electric crane takes the ladle of molten matte to the end of the converter building and there pours the hot metal into the tilting reverberatory. When the converter is ready for a charge the 40-ton crane in the converter building places a large matte ladle in front of this furnace, and by hydraulic power the furnace is slowly tilted until there is enough for a charge. The large crane transfers this molten matte to the converter into which it is poured. The converter is then turned into an upright position and the blast turned on.

"The pressure blast is 10 pounds per square inch. The blast is maintained until such time as sufficient slag has formed. Then the blast is turned off and the slag skimmed into a large ladle. This ladle is then carried by a crane and the slag is poured hot into the tilting furnace. The converter is then blown for a short time when the matte is all converted into metallic or blister copper, still retaining the gold and silver values. The moulds on the carriages are now brought into position by the hydraulic ram and the copper is slowly poured out of the converter into these moulds. The copper, which is 98½ per cent. pure, is then moulded into cakes weighing about 300 pounds each. The converter is now ready for another charge. It takes from two to four hours to convert one charge into metallic copper. By converting the matte at the smelter, a saving of fifty per cent. in freights is effected.

"The converter began operations on January 15th last. Besides converting its own product, the Granby company has closed contracts and is now treating matte from the smelters of the British Columbia Copper Co., Greenwood, B. C.; the Hall Mines, Nelson, B. C.; and the Van Anda Co., Texada island, B. C. Within a few weeks, when the Granby plant will have four furnaces, the converter will be producing approximately about 1,000 tons of blister copper, besides the gold and silver values, monthly. This will be at the rate of 2,000,000 pounds monthly, or 24,000,000 pounds per annum. Although no official returns are available, it is generally understood that the gold and silver values constitute an important feature of the product of the *Knob Hill-Old Ironsides-Victoria* group, owned by the Granby company."

Note by Provincial Mineralogist.—The following information relating to certain coal discoveries on the north fork of Kettle River is supplied by Mr. N. E. Linsley:—

Coal.

"My examination of the coal fields of the north fork of Kettle river was extremely cursory, and was confined chiefly to observations from a commercial standpoint. I did, however, note some geological features along cut banks and where the formation was free from vegetation and drift. These newly-discovered coal fields are situated on the west fork of the north fork of Kettle river, and are about 60 miles in a northerly direction from Grand Forks. A good waggon road has been completed for the first 25 miles of this distance, and the remainder of the journey is over a fairly good trail, a large part of which has been built very recently. To avoid crossing the river and rocky bluffs, this trail is made unusually long, and were a railroad to be built from Grand Forks it would shorten the distance by at least 4 miles, and the grade would be easy, as the river at the coal fields has an elevation of only 1,750 feet greater than the river at Grand Forks. The west fork of the north fork of the river appears to me about 18 miles north of the coal fields, and a much larger valley opens out above a canyon which occurs a short distance above Driftwood creek, and is about 5 miles long.

"From what I could see from the mountain above the coal fields, and from information gained from a prospector, the basin of the river and the slopes of the hills are covered with a dense forest of spruce, cedar and hemlock, and it would appear that the west fork of the north fork of Kettle river is a great store-house for mining and building timbers. There are some fine white pines, and, before reaching the coal fields, for 40 miles along the valley and mountain slopes, vast areas of tamarack, red fir and 'bull' or yellow pine are encountered. Tamarack predominates and red fir comes second; both are of a suitable size for mining and tie timbers. The wood can be floated down the river to the Granby Company's lake, where it will be close to the railway. The river should be 'driven' after the spring rise, with the water at about half stage.

"The coal formation is fragmental and consists of conglomerates, tufa, cinder rock and a more homogeneous volcanic rock as the uppermost stratum on the *Gilpin* claim, while on the *Wiseman* claim the exposed coal formation consists of conglomerates and slates.

"On both sides of the 'discovery' seam on the *Gilpin* claim the conglomerates are well sprinkled with carbonaceous material, such as fragments of plants, some an inch and one-half in diameter. Some of these specimens are, from appearance, a brown lignite, while others are impure coal.

"The uppermost seam on the *Gilpin* claim was discovered under my direction, and is by far the best showing on the river. Below this seam comes first, 3 feet of clay of an inferior quality, and then 60 feet of conglomerate, chiefly granite boulders cemented with tufa. Above the seam there are first, 35 feet of well-rounded and well-preserved hornblende-granite boulders, cemented with volcanic ash, and above these again a more homogeneous and massive stratum of volcanic rock, which includes all the coal formation exposed above the well-defined stratum of granite boulders before mentioned.

"I found no indications of coal above the granite boulder stratum, and am quite positive that this last seam mentioned is the uppermost of the series.

"The average strike of the coal seams here is N. 2° W., and the average dip of the same is 48° to the west.

"On the *Gilpin* claim there are four distinct seams of coal exposed. The first and lower seam is $1\frac{1}{2}$ inches in thickness, the second 1 inch in thickness, the third $\frac{1}{2}$ inch in thickness, and the fourth 7 inches in thickness. This fourth and upper vein, where discovered, appeared to be at least 20 inches thick, but this showing was the result of pressure, since the coal being softer than the walls the great weight of the overlying formation had forced it out into the soil and glacial drift.

"A little less than one mile in a direct line up the river, on the east bank, is the *Wiseman* discovery. Here is exposed a stratum of slate, 12 inches in thickness, between two strata of conglomerates. Granite boulders predominate in the make-up of the latter. While the slate stratum is well defined, it has been subjected to intense pressure along the strike, and shows some pronounced wrinkles. Just over the slate and under the upper conglomerate, a small seam of coal was exposed in a cut bank at, or a little below, high-water mark.

"The coal showing is most pronounced at the discovery post, where a wrinkle has been formed in the slate stratum, but in no place does the exposure exceed 6 inches in thickness. The average thickness for 20 feet would be less than three inches.

"The strike of the bedding planes of the slate and conglomerates here is N. 15° E. and the dip is 30° to the east. You will observe that while the strike conforms nearly to the strike at the *Gilpin* claim, the dip here is to the east. Except at and near "discovery" on the *Wiseman* claim, the formation is obscure, being covered with rank vegetation and moss. The tilting to the east here has exposed the only slate stratum found in this vicinity, and this exposure is less than 200 feet in length. Just how wide the coal formation is at this point will be difficult to determine, as the ground between bluffs of conglomerate east of the *Wiseman* discovery (which are visible for less than 1,000 feet, the granite rocks being encountered 1,500 feet to the east) is covered with débris and vegetation. I do not estimate the width to exceed 1,000 feet.

"The coal formation shows most prominently on the south-east portion of the *Gilpin* claim, where it rises to a height of 300 feet above the river; it then drops down rapidly as Divide creek is approached and disappears under the glacial drift, not to appear again.

"I herewith attach partial analysis of the coal:—

"*Wiseman* coal:

Volatile matter	19.9
Freed carbon	27.2
Ash	22.9

"*Gilpin* coal :

Volatile matter	34.0
Freed carbon	55.8
Ash	10.2

"N. B.—There was no test made for sulphur, and undoubtedly the moisture was included in the percentage of hydro-carbons."

OFFICE STATISTICS—GRAND FORKS MINING DIVISION.

Free miners' certificates	610	$2,925 50
Companies' "	6	550 00
Special "	4	60 00
Records of Location	389	972 50
Certificates of work	835	2,585 00
Conveyances	208	536 20
Certificates of improvement	50	125 00
Filings	385	96 25
Permission to re-locate	2	25 00
Water rights	4	61 50
Abandonments	3	40 50
Miscellaneous		275 25
		$8,252 70

OSOYOOS MINING DIVISION.*

REPORT OF C. A. R. LAMBLY, GOLD COMMISSIONER.

I have the honour to submit herewith my annual report on the mining development in the Osoyoos Mining Division for the year 1901.

CAMP FAIRVIEW.

Stemwinder. The work done in this mine during the year consisted in sinking the main shaft (which is well timbered, 5 by 11 in the clear) a further depth of 120 feet, and a cross-cut was also run for 100 feet to tap the north ledge. A survey of the mine recently made shows that this vein changes its course, and it will be necessary to continue the cross-cut about 15 to 20 feet northward in order to reach it. A cross-cut was run 300 feet to cut the south ledge on the second level, but has not yet reached it.

The work to date amounts to about 4,000 feet, over half of which is on the leads, and a very large quantity of ore is in sight. The vein, on which most of the work has been done, is called the main ledge, and is of an average width of 8 feet at the surface, running through the full length of the claim (1,500 feet). At the first level the average width increases to 10 feet, at the second to 20 feet, and recent work proves the width at the 300-foot level to be 31 feet. The values of this large body of quartz, as far as ascertained, are in the neighbourhood of $3.60 per ton, from the second level to the surface, although assays every 8 feet in the drifts give about 50 cents higher. Seventy-seven samples taken as the drifting was continued on the third level averaged $6.33 to the ton of 2,000 lbs., but practically no ore from this depth has yet been milled.

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* *See* also report of Provincial Mineralogist on the Osoyoos Mining Division.

During the latter part of 1901 a force of 40 men was employed in the construction of a stamp mill of 26 stamps, with 12 vanners for the concentration of the sulphurets, which last contain about 60 per cent. of the values, the remainder being caught on the plates. The mill was completed on the 16th of November last, and all the stamps were working by the 1st of December, 1,956 tons of ore being treated up to the end of the year. This material was composed of that taken out during development work, and is no criterion of the value of the ore. The average assays of the heads taken during the run is $2.80 per ton of 2,000 ℔s. The mill returns are not available at the present, as the Company have not yet cleaned up, but over 100 tons of concentrates, worth $70 per ton, have been saved, and about 600 ounces of amalgam, worth about $3,000, were taken off the plates.

The construction of the head works will be completed in two weeks, and after that time extraction, milling and all other expenses should not exceed $2.50 per ton with the present limited capacity. The management intend to immediately increase the number of stamps, and power is already installed which will drive eighty altogether.

The work of erecting chutes, etc., on the third level, is going on, and in a month a considerable amount of the mill supply will be taken from this level, the ore from which is expected to go about 25 per cent. higher than that in the upper levels.

This is the only claim in the camp that has been worked to any extent during the year, the remainder only having assessment work performed.

OLALLA AND KEREMEOS CREEK CAMPS.

The principal work in these camps has been performed on the *Bullion' Tunnel*, the development work on which had reached a total length of 585 feet on January 1st, 1902, the progress made during the year just past being 75 feet. The work has not been continuous, but has been carried on only at intervals. The big ledge has not been reached, being still at an estimated distance of 200 feet from the present tunnel face. The results have proved encouraging.

The necessary assessments have been done on the *Flagstaff*, *Opulence* and *Elkhorn Groups* of claims, and the *Opulence* has been Crown-granted. On the *Dividend Group*, consisting of 6 claims, on Summit mountain, situated in the Upper Keremeos valley, the work accomplished consists of 4 open cuts and one pit sunk to a depth of 10 feet. The results of this work were satisfactory, demonstrating the existence of an ore body over 200 feet in surface width, the outcroppings showing over a length of 1,000 feet, and constituting literally a quarry of ore. The gangue of this ledge is a garnetiferous felsitic material throughout which copper sulphides are disseminated, and carrying lime and iron in sufficient quantities to constitute of it a self-fluxing ore.

On the *Green Mountain Group*, located immediately north of the *Dividend*, the principal claims have been Crown-granted. On the *Recruit* and *Connection* assessment work only, consisting of open cuts, was done. This, however, resulted in developing on the *Connection* an ore body of fair grade, carrying the usual pyrrhotite and copper sulphides, while a good-sized iron cap was exposed on the *Recruit*.

On Riordan mountain, at the west end of Keremeos valley, work on the *Shamrock* claim was performed, consisting of an open cut across the ledge 15 feet in length by 8 feet deep by 6 feet wide, all in ore. On the adjoining claim, the *Billy Goat*, an open cut 24 feet long by 5 feet deep by 7 feet wide was run across the course of the ledge, in continuation of a cut previously made, resulting in cross-cutting, for a distance of 42 feet, an ore body of as yet unknown extent, the entire length of the cut being in solid ore of high value. These properties, owned by the Keremeos Mining Syndicate, are situated on the Nickel Plate waggon road from Penticton. The average nuuber of men employed by the company during the year was five.

BEACONSFIELD CAMP.

Keremeos Copper Mines.

This camp is situated on Red mountain, near the headwaters of Keremeos creek, and six miles north-east of the *Nickel Plate* mine. The Keremeos Copper Mines, Limited, owns three claims, viz., the *Beaconsfield*, *Guinevieve*, and *Gibralter*. Work was commenced by this company in June, 1901, and four log cabins were built, one 26 feet by 16 feet, one 12 by 12, one 16 by 12, and one 10 by 10. On the northern slope of the mountain, about 400 feet above the camp, a tunnel was started, on the boundary line between the *Beaconsfield* and *Guinevieve* claims, 8 feet high and 6 feet wide in the clear, and is now in a distance of 130 feet. A track has been laid for 142 feet, from the brow of the dump to the breast of the tunnel. Six men were employed on the average during the year, one shift in the tunnel and the remainder doing assessment work on the other properties held under option by the company. On the *Centurian*, two shafts, both 6 by 8 feet, were sunk on the ledge, one 10 feet deep and the second 8 feet deep. On the *Mameluke* a shaft was also sunk for 8 feet. On the *Gibraltar* the work consists of one shaft 8 by 8 feet and 9 feet deep; on the *Lady May*, of one shaft 8 by 8 and 8 feet deep; on the *Westward-Ho*, of a shaft also 8 by 8 feet and 8 feet in depth, and on the *Lady Bertha*, of a shaft 10 feet deep. On the *Kenilworth* the work consists of one open cut, 16 feet in length, 8 feet wide and 6 feet in depth, and on the *King Arthur* one open cut 12 feet wide, 15 feet deep and 10 feet long. In addition to the above work the company had men employed clearing the waggon road of slides, and also built three miles of trail through heavy fallen timber, and graded one and a half miles of four feet in width. On the *Nickel Plate* mineral claim the work done during 1901 consists of 750 feet of drifting and cross-cutting, 100 feet of sinking, and 150 feet of raises. New machinery has been installed, comprising one boiler and one 14 by 18 Ingersoll air compressor with a capacity of 2 drills. Number of men employed, 20.

OFFICE STATISTICS—OSOYOOS MINING DIVISION.

Free Miners' certificates	276
Location records	309
Certificates of work	533
Records of conveyances, etc	104
Certificates of improvements	10
Records of water grants	4
Abstract of revenue received during 1901:—	
Free miners' certificates	$1,899 25
Mining receipts	2,670 20
	$4,569 45

VERNON DISTRICT.

VERNON MINING DIVISION.*

REPORT OF L. NORRIS, GOLD COMMISSIONER.

I beg to report that scarcely any development work has been done on the mines in this division, during the past year, beyond the necessary assessment work on the various claims. I have, therefore, nothing to communicate beyond the following statistics furnished by Mr. J. C. Tunstall, Mining Recorder, which show the mining transactions during the year.

Individual free miners' certificates	149
Company 〃 〃	3
Mineral records	38
Placer 〃	3
Certificates of work	48
Transfers	20
Mining leases	1
Crown grants issued	3

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* *See* also Report of Provincial Mineralogist on the Vernon Mining Division.

YALE DISTRICT.

From Report of G. C. Tunstall, Gold Commissioner.

I have the honour to submit my report of mining operations in the Yale District during the year 1901.

KAMLOOPS MINING DIVISION.

The principal mineral claims in the Kamloops Mining Division lie in the vicinity of Coal hill and are distributed over an area about 8 miles long by 3 broad. The values are chiefly in copper and gold, the character of the ore being chalcopyrite. A description of the individual claims is given later.

Coal.

I regret to say that, owing to the difficulty in obtaining capital to prospect for coal on the property owned by the Hudson's Bay Company, about 5 miles west of Kamloops, the bond obtained lapsed and nothing further has been done with the object of ascertaining the value of this deposit. The late Dr. Dawson, of the Dominion Geological Survey, was the first person to call public attention to the probable existence of coal in this vicinity. The formation is a sandstone which affords little resistance to the operations of a diamond drill and the ground could be tested at a comparatively small expense. The value of the discovery of a suitable deposit of coal in this locality, which lies close to the railway track, cannot be overestimated.

Coal Hill.

Iron Mask.

The following work and improvements have been effected on the *Iron Mask* since my last report, viz.: The double compartment shaft has been sunk 270 feet, making a total depth of 400 feet; a drift 250 feet long has been run along the course of the vein at the 200-foot level, and one of 190 feet at the 300-foot level. To overcome a heavy flow of water, a 40 horse-power boiler has been substituted for the old one, and a pump with a capacity of 300 gallons per minute placed in position. A new shaft-house has been erected (72 by 40 feet), which also contains the blacksmith shop, and a retiring room for the men, heated with steam, where they change their clothing before resuming work in the mine. The bunk-house has also been enlarged to accommodate 36 men, and stabling has been provided for horses.

The work has been pushed forward with a force of 30 men during the summer, but in the winter the number will be reduced to 22. I am informed by Capt. Argall, the superintendent, that the ore is improving as depth is attained, and that the results have come up to the most favourable expectations.

This property was bonded about eighteen months ago by the British Exploring Syndicate, for the sum of $40,000, which has all been paid up, while fully $40,000 more have been expended in improvements and development work.

Six carloads of shipping ore, produced in the course of development work, have been forwarded to the Granby smelter for testing purposes, and a return of $3,400 was obtained, while another car was ready to start for the same destination at the time of my visit. A survey of a waggon road with a favourable grade, leading directly north to the railway track, where a spur can be provided for the loading of ore on the cars, has been made. This will lessen the cost of teaming one-half by reducing the distance to the C. P. R station about three miles, besides avoiding several ascents on the present road.

Lucky Strike.

The *Lucky Strike* is situated south of the *Iron Mask* and is owned by the same company, the British Columbia Exploring Syndicate. A drift has been run from the 60-foot level for 120 feet along the course of the vein. A car load shipped last summer to the smelter yielded a return of 20.7 % in copper, $6.60 in gold and $1 in silver to the ton. The lode is between three and four feet wide. This location was purchased several years ago for $5,000 and will not be worked immediately as the company is at present applying all its efforts to the development of the *Iron Mask*.

The *Navy Group* is situated about six miles south of Kamloops and embraces the *Cyclone*, *Admiral Dewey*, *Black Beauty*, *Sampson* and *Schley* claims. An expenditure of $4,000 was made last summer in open cuts and tunnelling, developing two bodies of ore, each over three feet six inches wide and carrying a value of about $45 per ton. These properties are owned by Mr. L. W. Nestelle and associates, of Seattle, Wash. The work done has proved so encouraging that it is the intention to resume operations this winter.

Wheal Tamar Group.

This group, owned by Messrs. Boillot Bros., of Paris, France, and Messrs. Batchelor and Rogers, Kamloops, lies some six miles south of the latter place. The work performed consists of a long cross-cut, and the shaft has been sunk to a depth of 10 feet.

Noonday Group.

The *Noonday Group*, comprising four claims, is owned by Messrs. Batchelor, Ford, Macdonald and Robinson. On one claim a shaft has been sunk for 100 feet. The work performed last summer consisted of extending the drifts at the 50-foot and 100-foot levels. The vein matter is a white quartz, carrying some free gold. It is the intention to sink the shaft another 50 feet.

Kimberly Group.

The *Kimberly Group*, comprising seven claims, was sold the year before last to the Kimberly Copper Mines of B. C., Limited. The company reports an expenditure of $6,000 last summer in necessary buildings and development work. The ore body is 40 feet wide and carries values varying from $10 to $17 per ton.

Truth Group.

The *Truth Group* consists of the *Truth*, *Hope*, *Pearl*, *Jennie* and *Dakota* mineral claims, having a combined area of 247 acres and lying about 5½ miles south of Kamloops. The ore occurs in irregular bands in a body of felsite of considerable width. The surface has been well prospected on the *Truth* by means of shallow cuttings, and a drift has been run a distance of 100 feet from the bottom of a shaft 75 feet deep, cutting a band of ore 12 feet wide, which contains values varying from $1.22 to $6.24 per ton. Open cuts in the *Pearl* and *Dakota* claims show up similar bodies of ore.

Python Group.

The work for this year consisted in extending the tunnel 140 feet, making it 362 feet in length. Over 200 feet of open cuts have also been made on claims adjoining the southern boundary of this group and on which options are held. The tunnel, when completed, will drain a depth of 65 feet of water, which has accumulated since operations ceased in the shaft, and will render available a large body of ore. Four men were employed during the past year and altogether over $21,000 has been expended.

Chieftain Group.

Three locations form the *Chieftain Group*, viz., *Chieftain*, *Chieftain No. 2* and *Northern*, occupying 130 acres and situated on Sugar Loaf mountain. They were first located in 1896 by R. H. Lee, and sold by him last April to a company composed of Detroit business men and capitalists, who incorporated as an extra-provincial company under the title of The Chieftain Copper Mines of B. C., Limited, with head office in Kamloops. Prior to the sale of the property the original owner had prospected the ground by shafts and cuts, expending some $2,000, and since incorporation the present company has been steadily at work with a small force of men, besides awarding a contract for $1,500 worth of drifting and sinking.

The result of 130 feet of shafts, 30 feet of tunnelling and 180 feet of open cuts, completed to date, has been to prove the existence of five distinct surface lenses or veins, having a north and south strike, and from 50 to 1,000 feet long, all carrying copper-gold values. The assays of average samples are as follows:—No. 1 vein, in shaft 10 feet deep, copper 5%, gold $4 to the ton; No. 2 vein, 50-foot level, 3 feet wide, copper 7.5%, gold $3 to the ton; No. 3 vein, open cuts, copper 8.5%, gold $4 to the ton. Nos. 4 and 5 veins have not been prospected at depth.

The present expense of mining and reduction, including transportation, does not exceed $12 per ton, and the ore can be cheaply treated.

Rose Group.

The *Rose Group* lies within a mile of Jacko lake, and embraces three adjoining claims. Six small quartz veins, carrying values in lead, copper, gold and silver, traverse the property in a northerly direction. The owners are at present opening one of the lodes by a shaft, timbered throughout, and have reached a depth of about 30 feet. The vein, which is about 4 feet wide, contains several stringers of high-grade ore about 12 inches wide, samples of which have assayed between $600 and $700 in silver and gold. Insufficient work has been done so far to judge of the future of this property, but development will be energetically carried on for the next six months.

A series of cross-cuts and prospect holes have been made on the *Hecla Group*, proving the continuation of the *Kimberly* and *Python* lodes, both of which have been traced the whole length of the claims. The *Python* lode showed up very strongly on the *Hecla Fraction*, on which a shaft was sunk exposing a fine body of low-grade copper ore.

CHERRY CREEK.

Copper King.

The *Copper King* is situated 16 miles west of Kamloops, on the road leading to Savonas. This location contains some of the richest ore in the Kamloops Mining Division. The work accomplished during the past season consisted of 250 feet of drifting and cross-cutting. Two shipments were made to the Trail smelter; the first of 11½ tons of high-grade ore which yielded 1 oz. of gold and 6 ozs of silver per ton, and 20 per cent. copper; the second, of 18½ tons of low-grade ore, giving a return of .46 oz. in gold, 1 oz. silver and 7½ per cent. copper. Six men were employed during a portion of the summer.

Glen Iron Mines.

These mines have been leased to the Hall Mines smelter for a period of 5 years. Three thousand tons of ore were shipped this year before the strike in West Kootenay caused the lessees to cease further operations. One hundred and twenty-eight feet of tunnelling were completed during the past summer, and several cross-cuts made. Twenty-five men were employed.

THOMPSON RIVER.

Hill Top.

The *Hill Top*, owned by O. S. Batchelor, lies on the north side of the Thompson river, about five miles north-west of Kamloops. A cabin has been built, and other improvements have been effected. A number of cross-cuts show the vein to be very strong, and to extend on the surface a distance of 1,000 feet. The ore is a white, rusty quartz, averaging $3.08 per ton in gold and silver at the surface. A small chute of ore, which returns $30 in gold to the ton, has been found on the foot-wall of one vein.

BIG SHUSWAP LAKE.

Iron Mask. The *Iron Mask*, owned by W. J. Irving, lies 4 miles north of Sicamous. The ore is chalcopyrite, varying in value, but averaging about $12 to the ton. A tunnel 220 feet long has been run, which, when completed, will tap the main lode at a depth of 200 feet from the surface.

GRAND PRAIRIE.

Assessment has been performed on the *Key*, *Florist Queen*, *Alice Hay*, *Henrietta* and *Nelson.* The work done on the principal claims shows up a large quantity of molybdenite, of a good grade, in white quartz, as well as values in copper and gold. The vein is 10 feet wide.

SALMON RIVER.

On the *Salmon River Group*, comprising the *Iron Cap*, *Bonanza* and *Hope* claims, the work done has shown a dyke of considerable width, surface assays from which have yielded low gold values.

JAMIESON CREEK.

Homestead. A shaft 20 feet deep on this property exposes a lode of clean ore from 2 to 4 feet wide, containing iron pyrites, zinc and galena in a quartz gangue. The ore showed a marked improvement with the increase of depth. The average assay value is $8.50 in gold and silver. On the *Mollie Gibson*, an adjoining property, the vein is of a similar character.

SALMON ARM.

Work is to be resumed on the *Silver Sceptre.* This location was discovered in 1898 and caused considerable excitement in consequence of exhibiting a body of very rich argentiferous galena. This, however, suddenly gave out, and further work was suspended. It is supposed the mineral exposure was a slide from a higher elevation, and endeavours will now be made to trace the main ledge from which it was detached.

LOWER KAMLOOPS LAKE.

I have received the following information from Mr. A. J. Colquhoun :—

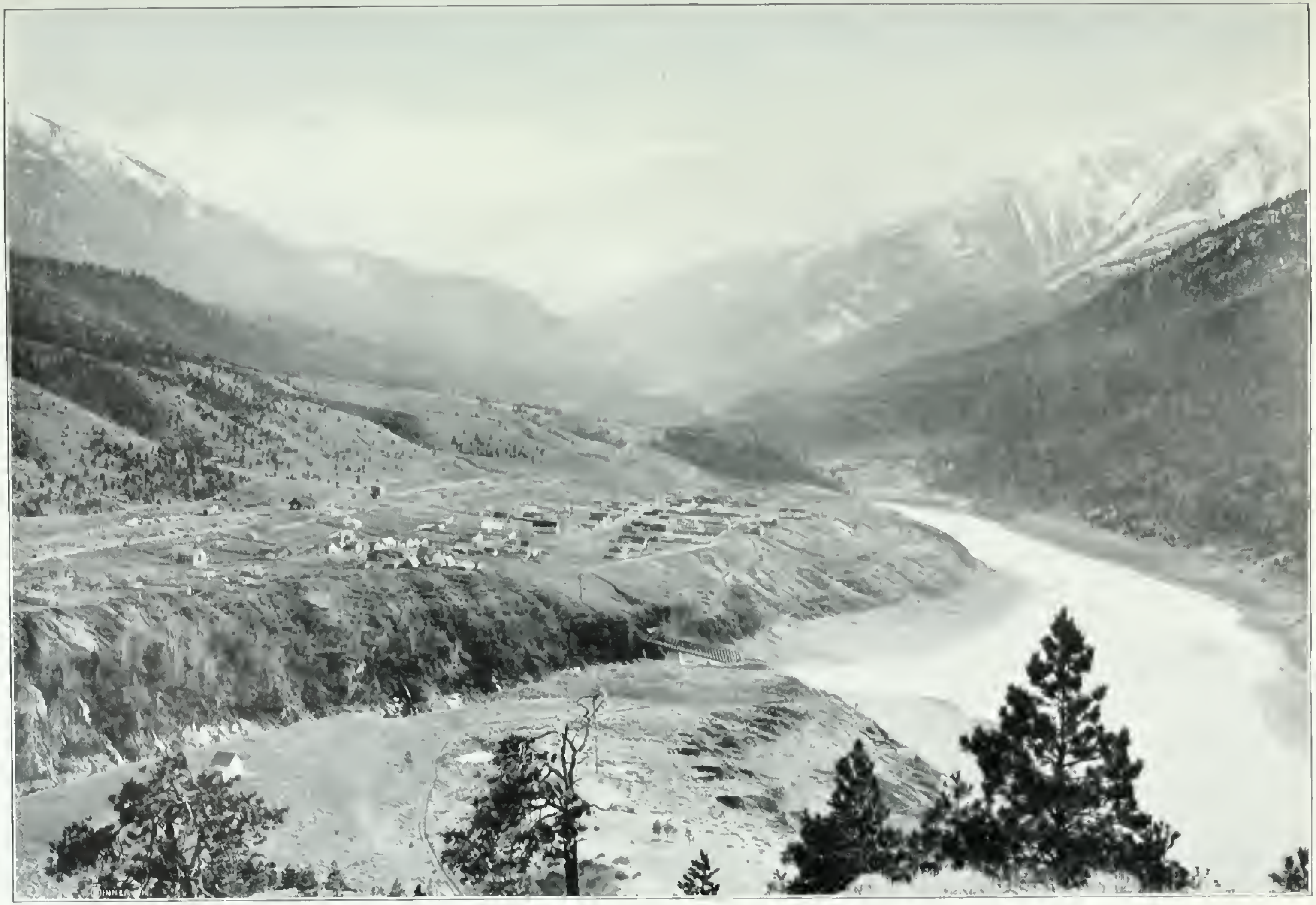
In the neighbourhood of Copper creek development work has been steadily proceeding on a number of claims, including the *Tenderfoot* and the properties of the Copper Creek Consols and the Hardie Mountain Cinnabar Co., on which $8,000, $2,100 and $2,500 respectively have been expended during the past three years.

Tenderfoot. Several men were employed on this property during the past year, and 400 feet of work have been added to the development already done. The ore body, which has a width of some 12 feet, occurs at a contact of porphyry and basalt, and gives an average assay of 5 % copper, and about $4 in gold and silver per ton. The same lead traverses the *El Progresso* claim of the Copper Creek Consols Co.

The owners of the *Sunlight* have commenced a drift to intersect the large vein at 150 feet below the former workings. This tunnel has to be carried 70 feet further in order to reach the lead.

The company owning the *El Progresso* is at present continuing the drift on the vein, which shows a considerable amount of very fair copper ore. On the *Sterling* some work has also been done on a continuation of the *Tenderfoot* lead.

Cinnabar. The properties owned by the Hardie Mountain Cinnabar Company, have been the subject of negotiations which it is hoped will lead to the speedy resumption of work on a large scale. On the other claims on Hardie mountain the necessary assessments have been performed, and on the *Toon-Kwa*, situated 12 miles south of Savonas, the work done shows a good body of cinnabar ore.



JUNCTION OF FRASER AND THOMPSON RIVERS AT LYTTON, B. C.

NICOLA VALLEY.

Mr. G. Murray, Deputy Mining Recorder, sends me the following information regarding the claims in the neighbourhood of Nicola :—

At 10-Mile creek, in the vicinity of Mamette lake, about 28 locations have been made. Prospecting in this section is attended with difficulty, owing to the lodes or ledges being covered with wash and débris. The work performed last season may be valued at about $2,800. Of this sum, $1,000 was expended on the *I. X. L.* On this location a depth of 100 feet was gained and at the 85-foot level a cross-cut was run 25 feet eastward, disclosing some bornite and native copper.

Assessment work has been done on the *Morning Star*, *I. X. L.*, *Golconda*, *Mountain View*, *Mary*, *Maud*, *Forest Rose*, *Alice*, *Champion*, *Copper Belle*, *Boulder*, *King Solomon*, *King Solomon's Dream* and *Midnight.* During 1900 assessment work was done on several claims for succeeding years, hence the limited number of assessments this year. It is gratifying to observe that most of the original locators still own the claims and that very little re-location has taken place.

In the neighbourhood of Quilchena there are about a dozen locations, more than half of which have been recently made, but very little work has been done. High values in free gold have been obtained on the *Goodenough* claim and if the surface showings continue with depth this should prove a valuable property. In the neighbourhood of Stump lake, too, there are a number of ledges assaying well in gold.

Near the foot of Mills mountain, Messrs. Ogilvie and Stumbles own three claims on which a shaft has been sunk to the depth of 40 feet. All the work has been in ore and the prospect is considered an exceedingly good one.

On the north side of Nicola lake Messrs. Richards and Lambert own four locations on which the required assessments were done, and on Mill creek Messrs. Hunter & Co., have completed the required number of assessments to obtain a Crown grant.

Railway communication is the chief requirement in this district.

NORTH THOMPSON RIVER.

Dredging.

I regret to say the dredging operations on the North Thompson river have not been attended with the success anticipated. The large dredge owned by Mr. T. L. Boyd, of London, England, with a capacity of 2,000 cubic yards per diem, and supplied with all the most recent improvements suggested by long experience, commenced operations on the 6th September last, and ceased working in the latter end of November. At the beginning frequent delays, incidental to the working of new machinery, were encountered, but, I understand, these difficulties were gradually overcome.

The manager, Mr. F. J. Tytler, informs me that the yield of gold amounted to but a few ounces, and that the results proved the portions of the river dredged to be too poor to give adequate returns. It was ascertained that the prospects found were only on or near the surface and did not extend downward through the gravel, as was expected. Operations are to be continued for a certain period under the direction of Mr. H. B. Bellamy, in order to ascertain whether losses can be attributed to the fact that the fine gold is returned into the river, in consequence of the table not being adapted to retain the smaller particles, and, if such be the case, to provide such remedy as is necessary.

At a depth of 16 feet a stiff blue clay was found to exist which occasionally yielded pieces ranging from 3 cents to 24 cents, but of an aggregate value not worthy of mention.

Other localities will be tested next summer with the object of proving their merit. Confidence still remains unimpaired in regard to the upper stretches of the river, in the vicinity of the Clearwater, where the conditions are different, and where platinum is found associated with the gold.

The Clearwater Placer Mining and Dredging Syndicate has bonded one of its dredging leases of five miles, to Mr. George Gaunt, of London, England, for the sum of $50,000, for a period of six months, dating from the 1st day of December. The leasehold bonded extends down stream from a point four miles south of the Clearwater.

NOTE BY PROVINCIAL MINERALOGIST.—The following notes relating to North Thompson river, in the Kamloops Mining Division, and to the Clearwater and Tête Jaune Cache districts of Quesnel Mining Division, have been obtained from Mr. J. C. Gwillim, B. A. Sc., late of the Canadian Geological Survey, who made a trip into this section during the fall of 1901. Mr. Gwillim says in a letter:—

"There appears to be a fair chance for prospecting in the country draining from the north-west towards Horsefly and Quesnel, but on the main river, in the granite, gneiss and mica schists above Allingham's, nothing has been found but good muscovite mica, and appearances are not favourable for metal mines.

"NORTH THOMPSON RIVER AND TÊTE JAUNE CACHE.

"Tête Jaune Cache is a point on the Upper Fraser river, about 140 miles N. N. W. of Revelstoke, and 150 miles N. of Kamloops by the maps. At this point the Fraser river issues from the Yellowhead pass, out of the Rocky mountains proper into that great valley which runs north-westerly from the U. S. boundary by way of the Kootenay, Columbia, Canoe and Fraser rivers.

"The original C. P. R. surveys of the 'seventies' came through this pass to the Cache, thence turning southwards, by way of the Albreda river, to the North Thompson river and Kamloops.

"Tête Jaune Cache may be reached, without much difficulty, from Revelstoke with small boats, or by a trail passing up the Columbia to the Big Bend, thence up the Canoe river to the crossing and overland by the great valley, 17 miles to the Cache. From Kamloops a waggon road follows the east side of the Thompson for 50 miles; a pack-trail is then taken for the remaining distance of 187 miles.

"The following distances are careful estimates made to the principal points along this route:—

"From Kamloops	to	Clearwater junction	73	miles.
"	"	Raft river	80	"
"	"	Mad river	103	"
"	"	Blue river	153	"
"	"	Albreda river	188	"
"	"	Canoe river crossing	220	"
"	"	Tête Jaune Cache	237	"

"Clearwater, Raft, Mad and Blue rivers are clear streams entering the Thompson from the west. They evidently have few or no glacial tributaries and drain a region of rounded, wooded mountains and plateaux. All of these rivers rise in the district south-east or east of the Horsefly river and Quesnel lake, and, at this time, may be interesting on that account. No important valleys or streams are tributary to the east side of the North Thompson, above Boulder creek. North of Blue river the mountains become very much higher, having slopes and peaks high above timber line. The rocks along the route from Kamloops to a point a few miles north of Raft river belong to various members of the Nis-conlith, Adams lake and Cache creek series, with small areas of later eruptives, and some sedimentary rocks containing coal of fair quality, as at the Indian reserve, 50 miles from Kamloops. Most of these rocks are dark and schistose or slatey, but there is also much massive diabase or greenstone. Their origin is principally eruptive. Throughout these rocks bodies and veins of mineral sulphides occur, chiefly as galena, bearing moderate values in silver (up to 100 oz. per ton). Such ores have been found on Louis creek, Barriere river, Boulder creek and near Raft river. They are probably of a similar nature to the discoveries of Adams Lake district.

"All of that portion of the North Thompson which flows through these dark rocks has been navigated by river steamers to a point a few miles above Raft river. At the point where navigation ceases there is a change in the formation, and from this point to Tête Jaune Cache, and beyond it, the country rock is granite, gneiss and micaceous schist, a series of rocks of Archæan age, known as the Shuswap series, and similar, in many respects, to the Shuswap rocks found between Slocan and Arrow lakes. These rocks, wherever observed throughout this portion of the country, showed no evidence of cross-fractures in the way of dykes or veins, nor were any mineral sulphides, common in most altered rocks, observed, excepting a little argentiferous galena at Mad river, in a glassy quartz gangue.

"Interbanded with these Shuswap micaceous schists and gneiss there are large masses of pegmatite, composed principally of albite or oligoclase feldspar and a vitreous quartz. Some of these pegmatite bands or masses are over 100 feet wide and several hundred feet long. It is in such quartz-feldspar masses that the large crystals of commercial sheet mica are found. These are very similar to the conditions under which mica of large size is found in other parts of the world. The country rock itself is not likely to carry such mica, and the pegmatite carries it in a more or less segregated manner, where certain conditions favour its presence in large 'books' or crystals of muscovite. The occurrence of this large 'book' or sheet mica is probably widespread throughout these ancient crystalline rocks wherever pegmatite masses occur. Such mica has been found near Big Bend, at Blue river, High bank, Canoe river, and near Tête Jaune Cache. The mountains, as usual where such rocks occur, are very rugged. There has been little prospecting done except by a few trappers.

"From Tête Jaune Cache some mica of good quality and value has been shipped over the rough 250 miles of trail to Kamloops. Excepting mica, this great series of crystalline rocks appears to offer little inducement to the prospector. There is usually evidence of a little gold in many of the streams, but not enough to give much encouragement.

"The principal mica deposits are, as far as seen, usually associated with a segregation of vitreous quartz. The crystals are not distributed through all the mass of the pegmatite, but are congregated at favourable places, some of which appear to be in proximity to a spur in the pegmatite, to a mica schist or to a dark micaceous wall rock and included masses of country rock in the pegmatite. The mica at times forms as much as 25 per cent. of the mass at such places, and this is a high per centage for such deposits. The quality and sizes of sheets are very good."

The following notes, also contributed by Mr. Gwillim, regarding the trail from Kamloops to Tête Jaune Cache, may prove of use to prospectors going in :—

"*Distances from Kamloops, and chief characteristics.*

Spratt's ranch,	19	miles,	waggon road,	open country.
Louis creek,	36	"	"	P. O. and store.
Barriere river,	40	"	"	bridge.
Indian reserve,	48	"	"	village.

Coal creek,	50	"	trail, easy ford.
Little Fort,	56	"	" over rocky benches.
* Boulder creek,	58	"	" turns up north bank.
Beaver lake,	63	"	over high burnt valley.
* Mosquito flats,	68	"	descends to N. Thompson.
Clearwater junction,	73		
* First crossing of N. Thompson river,	74	"	canoe takes loads, horses swim, no ford.
* Raft river,	80	"	good trail, usually forded.
* Peavine,	87	"	" grassy country.
* Allingham's ranch,	95	"	high bench, open country.
Mad river,	103	"	good trail, bridge.
* Round prairie,	109	"	" small meadow.
Wire cache,	115	"	" thick timber.
* Stillwater flats,	116	"	trail brushy, some sloughs.
* Cottonwood camp,	126	"	brushy, with meadows.
Little Salmon river,	129	"	" easy ford.
Lone grave,	131	"	trail leaves the flats.
* Dorr's meadow,	133	"	" hilly.
Hell gate,	135½	"	" " and burnt.
* Sunday camp,	142½	"	some rocky slides.
* Goose camp,	150	"	" sloughs and soft spots.
Blue river,	152½	"	descend steep hill, ford.
* Blue river meadows,	154½	"	soft, large meadows.
* Beaver camp,	155½	"	trail good, meadows.
Thunder river,	162½	"	heavily wooded, ford.
* High bank,	166½	"	trail brushy, fairly good.
* Apparajo camp,	183	"	rough, boggy and woods.
Cut bank,	186	"	trail damaged.
Second crossing of N. Thompson river,	188	"	forded at low water only, feed one mile further on.
Crossing of Albreda,	195	"	trail boggy, ford river.
* Summit camp,	204	"	trail good, low pass.
* Beaver camp,	207	"	" "
* Canoe river crossing,	220	"	fordable at certain times.
* Starvation camp,	228	"	trail good, open valley.
* Tête Jaune Cache,	236	"	" banks of Fraser.

"From Kamloops to the Indian reserve (48 miles) there is a good waggon road passing up the eastern side of the North Thompson valley. The country is more or less open, with bunch grass on the hills.

"A small store and post office is kept at Louis creek, and there is an Indian village at the reserve where horses and men can sometimes be obtained for travelling. From the reserve a trail continues for the rest of the way. On the whole it is a fair road for moderate loads with pack horses. Above Allingham's it becomes brushy, being grown up with under-wood, and there are many places more or less troublesome on account of boggy spots, according to the season of the year; very little repairing has been done, so that many small bridges have gone out of use. In August, during the high glacial water of the North Thompson, the sloughs on Clearwater flats, and between Sunday camp and Blue river, are some of them too deep to ford, but usually no great delay is necessary.

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* Feed for horses.

"Little Fort is the last occupied ranch on the river excepting Allingham's, 95 miles up. At the first crossing loads are transferred by canoe or raft and the horses are driven about 100 yards up the river and turned in to swim across. This place is not fordable but is not a dangerous crossing. From this point there appears to be a favourable chance to take pack horses up the valley or side-hills of the Clearwater towards the Horsefly and Quesnel lake country. It has been reported a bad country to traverse, but does not appear so and there are probably some more or less definite trails. Other routes have been used, from points higher up the Thompson, over into the Clearwater country. Most of the streams tributary from the west, such as Raft, Blue and the Upper Thompson, head over towards the Clearwater lakes.

"Raft river is the last stream which flows over the dark slates, schists, etc., of this district. After going north of this stream a series of granites, gneisses and micaceous schists, not promising in metalliferous minerals, is traversed. The worst portions of the trail are Stillwater flats with their sloughs and brush, Hellgate with a mile or so of rock slide, the portions between High Bank and Apparajo camps, and from the second crossing to the crossing of the Albreda.

"The second crossing and also the Canoe river may be forded or not according to the height of glacial water. There are canoes at all of these crossings.

"There is feed for a small band of horses at many places. All of these are marked with an asterisk. The principal meadows are at Mosquito flats, Raft river to Allingham's, Stillwater flats, Blue river meadows and Canoe river valley. With moderate pack loads of 200 pounds or less, the trips can be made in from 14 to 20 days from Kamloops to the cache. It is better to load light where horses are plentiful. The only places where the trail leaves the North Thompson valley are at Boulder creek as far as Mosquito flats and after the second crossing. There are no other misleading trails. At Boulder creek the new trail takes a circuit through a high valley to the east in order to avoid Assiniboine bluff on the main river. The old trail along the main valley is two miles shorter and capable of repair.

"From Kamloops to the first crossing, near the junction of the Clearwater, the road and trail are good. This distance (73 miles) should be made in four or five days.

"Note.—Information of portions of this district may be obtained from the Geological Survey Department at Ottawa. Such accounts are Dr. Selwyn's traverse from Kamloops to Tête Jaune Cache in 1871. Dr. Dawson's Kamloops map sheet from Kamloops to Indian Reserve, and Mr. McEvoy's Yellow Head Pass report of 1898, including the country about Canoe river and Tête Jaune Cache."

Note by Provincial Mineralogist.—The following memorandum relative to the trail from Donald to Tête Jaune Cache is the "log" of a pack train of about ten horses, the heaviest load of any one animal being 180 lbs. The packer who supplied this information considered this the most feasible and the best route into the district referred to :—

	Miles.	Hours	Remarks.
Donald to Summit lake	18	7½	
Summit lake to Bush river	12	5	
Bush river to Cedar river	14	5	
Cedar river to Middle river	16	8	
Middle river to Wood river	28	12	
Wood river to Cripple Horse meadows	22	11	
Cripple Horse meadows to Goat river	14	7	
Goat river to Tomkins creek	16	7½	
Tomkins creek to The Jam	12	5	
The Jam to Cache creek	14	7½	Bridges now being repaired (1899).
Cache Creek to Pack Saddle meadows	12	6	Trail good but soft at present.
Pack Saddle meadows to Tête Janne Cache	20	10	12 days travel, and 2 days laid off on account of rain.
	198	91½	

OFFICE STATISTICS—KAMLOOPS MINING DIVISION.

Free miners' certificates	$2,110 50
Mining receipts, general	5,466 55
	$7,577 05
Number of claims recorded	147
" certificates of work issued	218
" bills of sale, etc., recorded	92
" mining leases issued	5

YALE MINING DIVISION.

REPORT OF W. DODD, MINING RECORDER.

I have the honour to submit herewith my annual mining report and office statistics for Yale Mining Division for the year ending December 31st, 1901.

Placer Mining. The yield of gold from the Fraser river is decreasing year by year, and work is now carried on exclusively by Chinese, who rake and shovel merely the surface gravel for a few weeks in the spring and autumn, and as soon as the river rises in April the majority of them wend their way to the saw-mills, canneries and coal mines, where they can obtain more remunerative employment.

The amount of placer gold obtained in this Division during the year is $12,871.75; this information is obtained from reliable merchants who purchase the gold from the Chinese miners; a further sum of $3,000 would be a reasonable estimate of gold to add to the above as taken to China by individual miners leaving the Province.

Mineral Claims. Development work has not progressed vigorously during the year, in most instances the locators having performed nothing beyond the usual annual assessment work.

SIWASH CREEK.

The *Gold Queen Group*, owned by Messrs. Stenger and Stull of New Whatcom, comprises four locations, viz.: *Old Puss*, *Captain Jack*, *Low* and *Isabel* and the *British Queen*. The work consists of about 500 feet of tunnelling and cross-cuts, disclosing large quantities of sulphide ore carrying fair values in gold. On the *Old Puss* and *British Queen* the ledge is of a low-grade quartz and is of considerable width; assays range from $4.50 to $8.00 a ton in gold.

Ward Group. This property comprises the *Ruby*, *Independent* and *Ward*, owned by Lewis Stenger, of New Whatcom. The required assessment work has been performed during the past season, and tunnels of a total length of about 200 feet have been driven, showing good values in gold. Comfortable cabins and a blacksmith's shop have been built.

A 5-stamp prospecting mill has been erected adjacent to both the last-mentioned groups.

Montrose Group. This property, owned by Messrs. Dunn and Revesbech, comprises the following locations, viz.:—*Dandy*, *Montrose* and *Montrose Extension*. Work performed on the claims consists of 350 feet of tunnels and cross-cuts, showing some good ore, particularly on the *Dandy*, where assays of from $15 to $25 per ton in gold have been obtained. The ledge is now 8 feet wide at the face of the drift.

Gordon Creek Mountain.

The *Lady Frances Group*, owned by A. M. Herring and associates of New Westminster, consists of claims from which encouraging assays have been obtained. The second year's usual assessment has been performed in the past season by sinking shafts and uncovering ledges.

Hope.

On the *King* and *King Extension*, owned by Messrs. Wardle *et al*, tunnelling has been extended for 20 feet, showing rich prospects of galena ore.

On the *Home Bird*, owned by E. Odlum, a rock-cut of 20 by 18 by 6 feet has been made.

Union Bar.

The *Mackay Murphy* mine, located about 30 years ago, is owned by Wadleigh & Co., of Seattle, and held under Crown grant. Large sums have been expended in tunnelling into the mountain for a distance of 850 feet and some rich silver ore has been disclosed.

On the *Silver Coin*, *Minnehaha* and *Murphy Extension* considerable work has been done in sinking shafts, uncovering ledges, ditching, etc.

On the *Gisby*, *Mary Ann*, *Daisy*, *Ruby* and *Salmon River*, Messrs. Allan and Gisby have been for the past five years steadily engaged in driving rock tunnels, exposing a high grade of quartz carrying silver and gold.

Office Statistics—Yale Mining Division.

Free miners' certificates	$ 493 25
Mining receipts, general	2,075 10
	$2,568 35
Mineral and placer claims recorded	18
Certificates of work issued	33
Grants of water rights recorded	4
Conveyances and permits	16
Crown grants issued	4

SIMILKAMEEN MINING DIVISION.*

Report by Hugh Hunter, Mining Recorder.

I have the honour to forward the annual mining statistics for the Similkameen Mining Division of Yale District.

Little or no development work was done in the different camps this season, claim-owners having merely done sufficient to obtain certificates of work.

The claims on Copper mountain still continue to show improvement.

The *Princess May*, owned by Charles Powell, has an open cut 200 feet long and averaging 6 feet wide by 6 feet deep; assays, 9 % copper and $3 gold.

The *Red Eagle*, owned by A. E. Thomas, has a shaft 20 feet deep, 7 feet long and 5 feet wide, and an open cut 75 feet long, 6 feet deep and 4 feet wide; average assays 7 % copper, $3 gold.

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* *See* also Report of Provincial Mineralogist on the Similkameen Mining Division.

The *Jennie Silkman*, owned by French & Co., has a shaft in rock 20 feet by 5 feet by 6 feet, and open cuts totalling 100 feet long, 3 feet by 3 feet deep; assays 4 % copper, $2 gold.

The *Triangle*, owned by Thomas Bros., has a well-defined ledge, and a tunnel has been run for 30 feet; average assays 15 % copper, $3 gold.

On the *Red Buck*, on Kennedy mountain, owned by Revely & Allison, the work consists of a tunnel in rock 25 feet by 7 feet by 4 feet; assays 7 % copper, $6 to $8 gold.

The *Mogul*, owned by Peter Johnson, joins the *Red Buck*. The work consists of a series of open cuts; assays average 8 % copper and $8 gold.

The *Gladstone*, at Friday creek, owned by E. P. Wheeler, still continues to improve with depth. This season's work showed the vein increasing in width.

The *Cousin Jack Group* of claims at Boulder creek has been transferred to Alex. Galinger, of Wisconsin, who intends to form a stock company. Ore from this property averages from $20 to $25 in gold and copper values.

The claims at Summit city still continue to improve.

Considerable prospecting has been done for coal in the neighbourhood of Princeton, the Vermilion Forks Mining & Development Company having purchased a drill to still further explore the property.

The following information relating to claims in the Nicola section of this Mining Division has been received from Mr. G. Murray, Deputy Mining Recorder:—

The principal localities in which work has been carried on are the Aspen Grove, Ten-Mile creek, Mill creek, Quilchena and Stump lake camps.

On the *Little Lottie Group* of three claims, two years' assessments have been done. The ledge matter is extensive and carries a fair percentage of copper. On the *Little Joe* a shaft has been sunk for ten feet and shows 18 inches of well-mineralised ore.

Four assessments have been done on the *Copper Bell*, *Blue Bird* and *Franklin*. The work has given favourable results and assays of 15 % in copper have been obtained. A smelting test of the ore from this group gave 5.4 % copper with a small quantity of silver.

Two shafts, 12 feet deep, have been sunk and one open cut with a 12-foot face run on the *Nicola*, *Bachelor* and *Highland Groups*, showing well-mineralised ore.

The *Pearl Group*, composed of five claims owned by Messrs. Allan, Murphy and Angstead, has a tunnel over 60 feet long, disclosing a large body of cholcopyrite and bornite with fair gold values. The *Westminster Group*, on which an assessment has been done, also affords an excellent prospect.

On the *Lone Star*, owned by Messrs. Budd and Aldous, a shaft 19 feet deep discloses a ledge carrying chalcopyrite and some copper glance.

Assessments have been wrought on the *Joe Dandy*, *Vancouver*, *Dreadnaught* and various other claims in the same vicinity, all showing good prospects and yielding assays of from 5 to 17 % copper, while a short distance to the south there are 10 or more locations on Bare mountain, on which assessments have been done, showing high-grade ore.

On the *Monte Mira Group* two shafts, with an average depth of over 20 feet, have been sunk. The showing is such that the owners have obtained a very favourable bond.

Two assessments have been wrought on the *Hattie* and *Copper Jack* claims, owned by Messrs. Wells and Poulinier, with good results.

Cincinatti Group.

The most extensive work has been done on the *Cincinatti Group*, owned by Messrs. Bates Bros. & Co. A tunnel, which has been run on this property for 300 feet, starts in ledge matter, which it cross-cuts, and encounters successively two other ore bodies, of considerable extent and carrying good values, at distances of 100 and 225 feet, respectively. The tunnel is being continued for 30 feet to cut a fourth ledge of high-grade ore at depth.

Two assessments have been wrought on the *Big Dutchman Group*. The prospects obtained are exceedingly good.

On the *Portland Group* of 4 claims one assessment has been done and the surface showings are very good. The property has now been bonded to an Indiana company, buildings are being erected and it is intended to prosecute active development work. Mention may be made of the following properties :—

Boomerang, Liverpool, Medal and *Golden Sovereign Groups*: one year's assessment each.

Big Twins: a depth of 22 feet has been reached, showing high-grade ore.

Copper Standard and Amelia; four assessments, showing good ore.

Big Kid and St. Louis: two assessments.

The Big Giant Group, Hit or Miss and *Copper Queen* show copper ore of good grade.

Office Statistics Similkameen Mining Division.

Free miners' certificates	360	......	$1,358 75
Location records	374	......	
Certificates of work	441	......	
Conveyances	176	......	
Mining receipts general		......	4,237 80
Mining leases issued	2	......	
			$5,596 55

ASHCROFT MINING DIVISION.

Report of J. W. Burr, Mining Recorder.

I have the honour to submit herewith office statistics and annual report of the mining industry in Ashcroft Division of Yale District for the year ending 31st December, 1901.

Placer Mining.

The total amount of gold obtained by placer mining throughout the division for the year, as ascertained from merchants and miners, is about $29,285, which comes principally from bars and benches on the Fraser and Thompson rivers, and is mined mostly by Chinese and Indians with sluices and rockers, during low water in the spring and fall.

Dredging is merely in the experimental stage, and up till the present time has not proved a success. The dredger owned by the Cobeldick Co. has now been purchased by the Fraser River Gold Dredging Co., and, after being thoroughly renovated, appears to be working in first-class style. A short description of this dredge may not be out of place here. It is of the New Zealand type, of an endless chain of buckets (30 in all). Each bucket holds six cubic feet of dirt, and they are discharged at the rate of 15 buckets per minute, putting through on an estimated average about 5,000 cubic yards per day. The dirt is deposited into a revolving screen which is graded with holes from ¼ to ⅝-inch, and dirt of that size all passes over the gold saving tables, which are covered with cocoanut matting with expanded metals and riffles on the top. The coarse dirt passes right through the length of the screen and out at the stern of the dredge The dirt is washed by the water supplied by a 12-inch centrifugal pump, and the water is led into the screen by a perforated pipe which runs the whole length of the latter. The whole machinery is driven by a 30 horse-power reversible engine, the steam being supplied by two boilers, which require about six cords of wood for the three eight-hour shifts which are run. The dredge is shifted by means of two powerful winches, one with a single barrel for a head line on the port side, and the other with six barrels, one for a head line, another for the ladder line, and four for the side lines. The dredge is worked from side to side of the river, taking a cut of five feet, and whatever depth it is thought advisable. The ladder is capable of working to a depth of forty-five feet, but according to the nature of the dirt it is not advisable to work to that depth, as the gold, as a rule, is all on the surface, or within the first four feet, and is exceedingly fine, which makes it difficult to save.

Mineral Claims. Quartz mining has been carried on to a considerable extent throughout the division, principally on Criss and Deadman's creek, and in Highland valley.

The *Mersey* and *Afton*, owned by the Copper Creek Consols, Limited, are situated on Criss creek in the bottom of a canyon. The situation has rendered development difficult, but a considerable amount of work has been done on the *Mersey* to the extent of about $1,000. On vein A on this claim a shaft has been sunk for 20 feet and a drift run for 12 feet; the lead is about three feet wide and assays 1.8 per cent. in copper and 17 ozs. in silver per ton. Vein B has been stripped for 80 feet and drifted upon for 10 feet; a number of open cuts have also been made. The latter vein is about four feet wide and assays about $11 in gold and silver, with a small per centage of copper and lead. The ore concentrates well.

On the *Humber*, adjoining the *Mersey*, a large body of ore is exposed in the creek bottom and yields an assay of $13 in gold and silver. A short piece of road, to connect with the Deadman's creek waggon road, would greatly facilitate the development of this property.

On the *Spey* the last work done has exposed a wide body of low grade cinnabar ore.

At Highland valley a large amount of development work has been accomplished for the year, chiefly on the mineral claims *Last Chance* and *Sunset*, owned by J. G. Kirkpatrick, which have proved to be very rich in copper, gold and silver. On the *Transvaal Group*, owned by Messrs. Novak, Hoskins and Knight, and comprising the following claims, viz.: *Transvaal*, *Mafeking*, *Ladysmith*, *Chamberlain*, *Imperial* and *Pretoria*, good sized bodies of ore have been opened up. The chief requisite for this property is a road to connect with the present waggon road going to Pennie's.

OFFICE STATISTICS—ASHCROFT MINING DIVISION.

Mineral claims recorded	54	
Placer "	6	
Certificates of work	26	
Free Miners' certificates	118	$867 16
Mining receipts, general	96	591 40
Mineral tax	1	35 00
Mining leases issued	7	
Total		$1,493 56

LILLOOET DISTRICT.

CLINTON MINING DIVISION.

Report by F. Soues, Gold Commissioner.

I have the honour to submit herewith mining and office statistics and annual report for the Clinton Mining Division of the District of Lillooet for the year ended December 31st, 1901.

The total ascertained yield of placer gold for this Division during the year is $6,080.

The mining industry has been at a very low ebb throughout this Division during the year.

Placer Mining. This class of mining is represented by three leases near Big Bar, which are now in the hands of one company, and, up to the present time, I have been unable to get the returns from the Superintendent. Work on all these mining leases was suspended in the early part of last November.

Mineral Claims. I have to report the discovery of chromic iron ore, of which there is a very large deposit, on a tributary of Scottie creek, which is, in its turn, a tributary of the Bonaparte river. From samples which I forwarded to the Geological Survey at Ottawa, Dr. Hoffman made an analysis of the mineral, the full particulars of which have not yet come to hand, but he advised me in October last that one of the samples contained 47.11 per cent. of chromium sesqui-oxide. From another sample, which was taken about 500 feet from the first, the returns are given as containing 39.94 per cent. of the same mineral; while a third sample, which was taken about 1,200 feet from the first referred to, contains 31.26 per cent.

Another discovery of gold-bearing ore was made in the early part of this summer on Maiden creek, also a tributary of the Bonaparte. This ore consists of a very large deposit of a conglomerate, which, to the ordinary eye, looks exactly like sandstone, but is in reality a fine quartz conglomerate. I forwarded samples of this also to the Department at Ottawa, and am advised by Dr. Hoffman that the matter is a yellowish white conglomerate carrying fine parts of native gold. I understand that assays have been made of this conglomerate which go as high as $3.75 per ton, and judging from the very easy way in which the material could be worked and the enormous deposit which exists, it might pay very handsomely, although as a matter of course operations would have to be conducted on a large scale.

Several mineral claims have been taken up on the Bonaparte during the past year, all carrying more or less values in copper and silver. The mineral claims which were taken up on the west side of the Fraser river and south of the mouth of the Chilcotin river in 1890, up to the present time have had nothing done on them other than the development work as required by the Statutes. On the Natron lakes, to the north of Clinton, there has been no work done during the past year, and the statutory amount on the whole of the claims was paid in cash in place of development.

Dredging. This class of mining in this Division has been at an absolute standstill throughout the year. The dredger, together with the whole of the dredging plant, that was on the Fraser river at Big Bar, and owned by the New Fraser River Gold Mines Company, dragged from its moorings at high water last year and went down the river. It was, I understand, a total loss.

Coal. I am not aware that anything has been done on the lignite deposits on Hat creek during the past year. On the North Thompson prospecting is still going on, but I am without information as to the results.

OFFICE STATISTICS—CLINTON DIVISION OF LILLOOET DISTRICT.

Mineral claims recorded	29
Placer claims recorded	1
Conveyances	3
Certificates of work	12
Water grant recorded	1
Dredging leases in force	12
Mining leases in force	9

Revenue Collected.

Free miners' certificates	$217 25
Mining receipts general	903 00
	$1,120 25

LILLOOET MINING DIVISION.

REPORT OF C. PHAIR, GOLD COMMISSIONER.

I have the honour to submit my annual report of mining operations in Lillooet Mining Division during the year 1901. Heretofore no separate report has been made for this division, the whole having been included in one report under the heading "Lillooet District."

The value of the placer gold taken out, as reported by merchants and claim-owners, is $20,000.

Mineral Claims. A good deal of development work has been done on the Toronto-Lillooet Gold Reefs' claims, at Cayoosh creek; on the Anderson Lake Mining and Milling Company's claims, at McGillivray creek; on the *Lorne Group*, *Woodchuck Group*, *Alhambra Group* and the Bend 'Or mines, at Cadwallader creek.

TORONTO-LILLOOET GOLD REEFS, LIMITED.

This company only worked its claims for about three months during the year and then went into liquidation. Mr. J. Preston Forde, C.E., who had charge of the properties at the time, reports to me that from the first of the year until the 8th May, 1901, from 20 to 25 men were constantly employed, both in mining ore for treatment and in development, and that although sufficient work was not performed to class the property as a mine, yet everything points to the existence of a very large body of low-grade ore. The mill resumed operations on March 9th, but as the extraction of gold from the ore averaged only 50 % of the assay value it was decided to stop all operations until a roasting furnace could be put in, which the financial position of the company at the time, unfortunately, rendered impossible. Tests of the roasted ore show that an extraction of from 92 % to 95 % may be easily obtained by cyaniding. During the time the mill ran 950 tons of ore were treated, the assay value of which was $11.20. It is hoped that the company may soon be able to make the necessary arrangements to clear off its indebtedness and resume operations.

Anderson Lake Mining and Milling Company.

This company has been steadily working during the season. The development consists of a tunnel on the ledge for a distance of 450 feet; two up-raises of 105 feet each, connecting No. 1 tunnel with No. 2 tunnel and two up-raises, of 75 feet each, from No. 1 tunnel to the surface. These up-raises supply plenty of fresh air and also facilitate stoping. The ledge averages 10 feet in width and has well-defined walls. One thousand five hundred and twenty tons of ore were milled, yielding about $7,200. Very rich specimens of ore carrying free gold are often found. The number of men employed is 10.

The *Lorne* and *Woodchuck Groups* were bonded last year to the Mines Exploration Co., Limited, for $225,000, and this company also purchased one-third of the *Woodchuck Group* for $15,000 and, under the management of Mr. Leslie Hill, M.E., drove 954 feet of tunnel and erected a 5-stamp quartz-mill at an expenditure of $17,641. Work, however, was discontinued before the close of the season and it was decided not to take up the bonds. The average number of men employed was 30.

The *Alhambra Group* is owned by Mr. Milton Rathburn, of New York, and, under the superintendence of Mr. Leslie Hill, 438 feet of tunnel have been driven. The average number of men employed is 8.

Bend 'Or. Mines.

Work commenced on this property on the 5th March and ceased on the 14th August, during which time 1,200 tons of ore were milled, yielding $9,000. Development includes 150 feet of tunnelling and the stripping of 150 feet of the ledge. The company has been compelled to go into liquidation owing to the lack of working capital.

In addition to the development on the foregoing properties, assessment work has been recorded for 89 mineral claims, situated principally on or in the vicinity of Cadwallader creek.

The owners of the *Countless*, on Cadwallader creek, are erecting an arrastra to work a body of free-milling ore which they have uncovered in several places.

On the *Pioneer*, adjoining the *Countless*, a vein showing free gold was exposed and the owners have erected a one-stamp mill.

Placer Claims.

On the north fork of Bridge river Mr. W. W. Brown, General Manager of the Bridge River Development Company, has carried on operations during the year and is now ready to commence hydraulicing when next season opens. Work was resumed on the 26th of March with 36 men, which force was gradually increased to 85—not including 10 saw-mill men. Three miles of ditch line were constructed, 4½ feet wide at the bottom, 7 feet wide at the top and 3½ feet deep, and a 24-inch pipe line and a No. 4 monitor were installed. The high bank—302 feet—was opened up and the upper and lower pits were advanced a total distance of 390 feet. A saw-mill was also installed, the daily output being 5,000 feet B. M. There is also under construction 660 feet of 4-foot flume, and 750 feet of 3-foot flume. The Government built a good trail to these mines.

The mining lease at Lillooet belonging to the Lillooet Hydraulic Mining Company has been worked by 6 Chinese, who report having taken out $1,156.

The Southard mining lease on the Fraser river, opposite the Fountain, was only worked a short time. Mr. Southard spent the early part of the season procuring an additional hydraulic plant at a cost of $4.000. Soon afterwards his cable bridge across the Fraser, on which the pipe is laid, collapsed, owing to the slipping of the clips, 700 feet of pipe being lost. The damage was, however, repaired in two weeks.

The Bridge River Hydraulic Mining and Milling Company was formed for the purpose of working the Glen and Richardson lease at the south fork of Bridge river. A saw-mill was erected to cut lumber for flumes, etc., but the water brought into the ditch for the purpose of driving the mill was inadequate and work was therefore suspended awaiting the construction of a new ditch.

On the tributaries of upper Bridge river, where there is coarse gold, desultory mining has been carried on by both whites and Chinese. As the cost of packing supplies to these creeks has greatly diminished, owing to a 6-foot trail having been constructed nearly the whole distance, it is probable that the attention of miners will again be directed to this locality.

Seven men are building 750 feet of wing-dam on lower Bridge river, having obtained good prospects, and they intend to continue operations all the winter.

RIVER DREDGING.

The small plant operated on the Fraser river, at Lillooet, has proved a failure, but it is reported that a large dredger—similar to the one at Lytton—will be constructed shortly to replace it.

OFFICE STATISTICS.

Mineral claims recorded	74
Placer claims	6
Certificates of work recorded	104
Conveyances, etc., recorded	56
Free Miners' Certificates issued	187
Certificates of Improvements issued	10

Revenue Collected.

Free Miners' Certificates	$1,453 75
Mining receipts, general	1,638 90
Mineral tax	195 25
	$3,287 90

VANCOUVER ISLAND AND COAST.

ALBERNI DISTRICT.

ALBERNI MINING DIVISION.

Report of A. L. Smith, Gold Commissioner.

I have the honour to submit my report of mining operations in the Alberni Mining Division for the year 1901.

Nahmint Mining Co.

For the past year active operations in mining have been confined mostly to the vicinity of the Alberni canal. The most important and extensive development work has been carried on at the Nahmint Mining Company's property, on the Alberni canal. This property is situated on the west side of the latter, about 13 to 14 miles from Alberni, and is better known as "Hayes Mine." It is expected that regular shipments of ore will now be made, a steamer having been engaged to carry some 500 tons per trip.

The underground workings show a total of 5,000 feet of development. Of this amount 1,500 feet were driven in 1901. The company has installed quite a lot of new plant, including a 10-drill Rand compressor with two 70 h. p. boilers, and an automatic tramway, 5,000 feet in length, with a capacity of carrying 100 tons per 24 hours, has also been constructed from the mine to the wharf on the canal. A new power house has been built, and also a terminal building.

The average number of miners employed for the year was 35, while 25 men were otherwise constantly at work on the property, chiefly at the construction of the new buildings, tramway, etc.

Iron.

The Pacific Steel Company has steadily carried on development work at the Sechart mine. The work done on this property is as follows:—Open cuts, 500 feet; tunnels and drifts, 375 feet; shaft and winze, 35 feet. A great deal of stripping has been accomplished, exposing the ore, which is magnetic iron of a good quality.

Three blacksmith shops, a house for the superintendent of the property, with 7 rooms, besides outhouses, a good wharf and cabins or bunk houses for the employees have been erected.

The average number of miners employed, from January to June, was 6. The group comprises 8 claims situate on the southern slope of Broughton peaks, Barkley sound, about 1½ miles from tide water, and at an elevation of 1,000 feet. There are good trails built to each of the claims.

This company has also operated at Copper island extensively. The work done there is as follows:—Open cuts, 250 feet; tunnel and drifts, 145 feet; shaft, 72 feet. Owing to the character of this property a large amount of clearing and surface stripping was necessary to expose the ore, which is also magnetic iron of a good quality.

On this property there are 4 good cabins for miners, blacksmith shop, storehouse, etc.

During the year 8 men were constantly employed, 6 as miners and 2 as labourers. The property comprises 5 claims close to tide water, the highest point at which work has been carried on not being more than 700 feet above sea level.

At Sarita the same company has been developing a body of magnetic iron ore. Work as follows has been done :—Open cuts, 300 feet ; tunnels, 124 feet ; shaft, 10 feet. Several pits have also been sunk, and a large quantity of stripping done. The average number of miners employed was 6, while one man was engaged in general work.

The property referred to consists of one mineral lease on the Indian reserve near to the Sarita river. Surveyors are at present locating a route for a railroad from the mine to the wharf, preparatory to shipping ore.

Monitor.

The *Monitor* mine was worked during the past season, but towards the end of the summer operations were stopped in order that the company might be reorganised. This has been successfully accomplished, I am informed, and mining will again be commenced, about the 1st of March, in an extensive manner. The total number of feet of work performed is 380 ; of this 240 feet were driven in 1901. The nature of the ore is chalcopyrite mixed with magnetic iron. From 7 shipments to the Tacoma smelter, amounting in all to 992 tons of ore, an average value of $30 per ton was obtained. On the property there is an aerial tramway, ½ mile in length, from the mine to salt water, with terminals, bunkers, a hoisting plant and the necessary pumps, skips, etc. A manager's office and quarters, bunk house and store rooms, men's sitting rooms, dining rooms, kitchen and mess house at the mine, with blacksmith shop and hoisting house, have been erected, while on the waterfront a good wharf is constructed. At present there are some 60 tons of ore on the dump, and the faces of the two drifts, where work was discontinued, showed a chute of ore 6 feet by 4 feet. The company has had the claims surveyed, and has applied for a Crown grant of the property.

NOTE BY PROVINCIAL MINERALOGIST.—The following report on the *Monitor* mine has been received from Dr. T. Rhymer Marshall :—"The country rocks in the vicinity of the *Monitor* mine are similar in character to those common to most of the copper belts of the west coast. Here we have the same altered shales and limestones, with intrusions of granite and feldspar porphyry. Running through the property there is a well marked dyke, about 100 feet wide, which has caused profound alterations in the surrounding rocks. The dyke is feldspathic with crystals of hornblende and a little quartz, and has been the direct cause of the formation of the ore-bodies, which are to be found in brecciated zones, either directly in contact with the dyke or in close proximity between the sheetings of the country rock. Above a large pipe of ore, which on exploitation was found lying in contact with the dyke, an open cut has been made by taking out the ore and vein matter from between two well-defined walls, evidently caused by the sheeting of the rock. Lying imbedded in the ore are the un-replaced fragments of rock. The foot-wall is deeply scored and polished, pointing to considerable downward and slightly lateral movements.

"The ore is not limited to this point, as a gutter indicating weathering of the outcrop can be traced on the surface, curving towards the shore, and where there is no overburden outcrops of yellow copper in garnetite and epidote are to be found down to the sea level. The ore-bearing zone is therefore of considerable extent and cannot be less than 1,000 feet in vertical height. There is evidence that the ore lies in this zone in chutes and lenses.

"The ore is a mixture of chalcopyrite, pyrrhotite and a coarsely crystalline magnetite, which have been deposited in the interstices of the brecciated rock, while the rock itself has

HEAD OF FREDERICK ARM—NANAIMO MINING DIVISION.

been more or less replaced by the sulphides and magnetite. The magnetite was deposited simultaneously with the sulphides and most probably was formed by the action of calcium carbonate on salts of iron. It is a well known fact that when an alkali is added to a hot solution of a ferrous salt the resultant ferrous hydrate is directly oxidised by the atmospheric (oxygen) to magnetite, Fe_3O_4."

At Smith's landing, on the *Modoc* and *Kitchener* mineral claims, considerable work was done this summer by the B. C. Agency, Limited, under the supervision of D. Gordon Smith, one of the company's engineers. A good showing of carbonate of copper, in auriferous quartz, occurs. The company has had both claims Crown-granted.

The *Thistle* property, on Douglas mountain, comprising five claims, was purchased last summer by a San Francisco syndicate, the Alberni Gold and Copper Co., Limited. Quite a lot of development work was carried on, exposing some fine chalcopyrite ore carrying a value of about $20 in gold. On an average 8 or 10 miners were employed.

This company commenced and nearly completed a good waggon road from the Alberni canal at Underwood's landing to the mine, a distance of about seven miles, but owing to the wet weather setting in the work was not progressing favourably and it was decided to discontinue operations till the summer. A force of about 100 men were employed for a couple of months on the construction of this road.

On the *Raven Group*, comprising the *Raven No. 1* and *Raven No. 2*, situated on the west side of Alberni canal about three miles from Alberni, some work has been done. A vein is shown about four feet in width and carrying about 8 inches of solid ore. A tunnel has been driven some 50 feet and about 25 tons of ore are on the dump.

The *S. S. No. 1* and *No. 2*, owned by Mr. J. G. Steever, and situated on Copper mountain, have a good showing of chalcopyrite ore; the tunnel, which is in some 25 feet, cuts through 12 feet of low-grade ore, and on the hanging wall 1½ feet of high-grade ore, carrying some 15 per cent. of copper, are shown.

OFFICE STATISTICS—ALBERNI MINING DIVISION.

Free miners' certificates, individual	132
Free miners' certificates, company	1
Mineral claims recorded	88
Placer claims recorded	2
Placer leases issued	7
Certificates of work	240
Certificates of improvements	1
Payments in lieu of assessment work	1
Bills of sale, bonds, etc., recorded	49

Revenue.

Free miners' certificates	$676 50
Mining receipts, general	2,197 00
Mineral tax	432 40
	$3,305 90

WEST COAST VANCOUVER ISLAND MINING DIVISION.

REPORT OF W. T. DAWLEY, MINING RECORDER.

I have the honour to submit my report of mining operations in the West Coast V. I. Mining Division during the year 1901.

The *Prince Group*, situate about 30 miles from Clayoquot, on Sidney inlet, is in charge of Dr. T. R. Marshall, and development work has been carried on continually during the year 1901, with satisfactory results.

The *Indian Chief Group*, in the same vicinity, is owned by the Dewdney Canadian Syndicate, Ltd., and much development work has been done, a road having been built through the property and continued on to the *Prince Group*. Application has been made for Crown grants.

TROUT RIVER.

The *Good Hope Group* is owned by the Helga Gold and Copper Co., and a large amount of development work has been done. A tunnel is now being run for 100 feet to tap the lode. Fine specimens of ore, of a very high grade, have been discovered. The property is situated about seven miles from Clayoquot, near the salt water.

DISAPPOINTMENT INLET.

The *Kalopa* claim is owned by Messrs. Jacobsen *et al.* A tunnel has been driven 100 feet, showing the lode the whole distance. The property has been bonded.

TRANQUIL CREEK.

A group of 18 claims, all Crown-granted, and owned by Gen. J. Ashton, of Tacoma, is situate about 30 miles from Clayoquot, and is considered a very valuable property.

DEER CREEK.

The *Hettie Green Group*, owned by James Thompson, of Alberni, is a very promising property. The ore consists of yellow copper and bornite.

Considerable development work has been done at Quatsino, Kyuoquot, Hesquiot and Nootka.

KENNEDY LAKE.

Several properties are being developed in this neighbourhood. W. N. Kenyon owns a group of four claims through which run three separate veins. These have been stripped and are shown to be continuous. The ore is free-milling, and an arrastra, to be run by water power, is under construction and will be put in operation in the spring.

WRECK BAY.

The black sand placer deposits at Wreck bay were worked during the year, but the season was bad owing to the heavy rains and seas, the surf coming up the beach to where sluicing was being carried on and greatly interfering with the operations. However, notwithstanding all drawbacks, some $9,950 were recovered.

Twenty-two men were at work during the season, from April 1st to September 30th. Mining was then suspended and 800 yards of new flume were built.

NOTE BY PROVINCIAL MINERALOGIST.—The following report on the West Coast V. I. Division is contributed by Mr. Chester F. Lee, M. E.:—

"The mining boom of a couple of years ago has been succeeded by a marked depression in the West Coast of Vancouver Island Mining Division. This is the result of a widely expressed opinion that the west coast of Vancouver Island is merely a country of prospects.

It is admitted that the surface 'shewings' are both rich and numerous, but there is a general suspicion that they lack permanence in lateral and vertical extension. The broken character of the country is given as a reason for this lack of continuity. This strong statement, however, has but little foundation in fact, as serious attempts to follow the ore in depth have indeed been few, and these few have met with success.

"The west coast is essentially a 'copper country,' and a series of mineralised belts may easily be traced. The prospectors at an early date recognised this fact and quickly classified the coast lands into copper belts and barren areas. The dark green rocks of these belts were all termed diorites. A careful examination over a considerable area will, however, convince the trained observer that the great mass of these so-called diorites are simply highly altered sedimentaries, which have been greatly disturbuted by intrusions of igneous rocks of varying acidity, which have given rise to strongly marked contact metamorphism. It is in these areas of alteration that the ore bodies may be found, and naturally the country would have a broken-up appearance. It must, however, be admitted that, since the ore bodies have been formed, dislocations have occurred, though not to an extent greater than is normal in all such steeply mountainous countries.

"The ore bodies seem to be those of more or less complete rock replacement, and examples may be seen where pure marble has been entirely replaced by massive chalcopyrite. The replacements have occurred at the actual contact of the dykes and bosses of igneous rocks with the sedimentary rocks, or in the intersections of fractures and joints in the rocks. The shoots of ore, as far as can be observed, seem to be so irregular in shape that surface examination, which has very great limitations in a country so thickly timbered, can be but a small aid to the discovery of the trend of the ore. The only safe plan to adopt in development work is to follow the ore and to avoid long cross-cutting, with the object of proving the ore in depth. Cross-cutting from the drifts at regular intervals is, however, essential, as often a thin but barren area of country rock will seemingly limit the ore body in a given direction.

"It cannot be expected that every likely looking prospect indicates a commercial ore body any more or any less on the coast than elsewhere. There is, however, a very misleading class of shewing which is simply secondary deposit of copper sulphides on the surface, and which is merely valuable in so far that it points out the vicinity of some primary deposit. The formation of these 'blanket veins,' as they are locally termed, is easily explained. The copper-bearing waters from some weathering ore deposit are acted upon by the organic matter of the 'over burden,' with the result that the sulphates are reduced to sulphides. A little work will soon expose the channels through which the waters travelled, but it would be dangerous to assume that the source of the copper is quite near. Sometimes these secondary surface deposits are the only visible signs of ore, as the primary deposit may either be blind or covered by over burden. It is also possible to find examples of secondary 'shewings' on one side of a mountain and the outcrops of the primary deposits on the other at a higher level. The conclusion to be arrived at is evident.

"There is another and numerous class of outcrops where the mineral is chiefly massive magnetite, grossly crystalline on the surface and often containing indications of copper, such as green stain, crystals of bornite and copper glance. Development is required, however, to determine the value of the copper and magnetite association. At Sidney inlet magnetite, associated on the surface with bornite and copper glance, gave place in depth to copper ore containing comparatively little magnetite. Probably much of the magnetite near the surface was purely secondary, being found by the weathering of the ore body. This view is supported by the fact that at a distance of 40 feet there was a zone of enrichment formed containing masses of bornite In some outcrops the magnetite is mainly the gangue residue left by the leaching out of the copper sulphides. This is indicated by the powdery character of the residue a few inches from the surface. The magnetite outcrops showing indications of copper may, therefore, be: (*a*) of purely secondary character; (*b*) or simply a gangue residue; (*c*) or a mixture of secondary magnetite and gangue residue.

"It is interesting to note that shallow, secondary deposits of magnetite are often found on the surface some distance from the source and generally secondary pyrite is to be found in the crevices of the rock behind the magnetite. The country rock in the vicinity is, as a rule, very much decomposed, seemingly by acid waters.

"Very little active development work has been accomplished in the West Coast of Vancouver Island Mining Division during the year 1901. A serious attempt was made on the *Superior Group* of claims, at Quatsino sound, to prove the ore in depth by tunnelling below the outcrops, but without success. The work proved costly on account of the extreme hardness of the country rock.

"The ore deposits of the district have mainly been formed by rock replacement along shear planes and on the contacts of the igneous dykes with the sedimentaries. There is an interesting example of rock replacement by ore on the *New Comstock* mineral claim. Here the mineral waters have at one time found their way along the intersections of the joints of the rock. As far as can be judged from surface indications the ore chutes are of irregular character, but there is no reason why they should not persist in depth, in fact it is highly probable that they do so, although difficulties may be met with in following the ore, owing to surface slips. Interesting samples may be seen of the silicification of limestone into the hard flinty silicate of lime.

"At Sidney inlet a few miners have been working on the *Prince Group* of mineral claims for about eight months. The rock work was practically confined to the neighbourhood of one outcrop. Over 200 feet of drifting and cross-cutting have been accomplished.

"The country rocks are metamorphic shales and limestones. Near the surface the ore body was very narrow and the copper was associated with much magnetite, but at about 40 feet from the surface the body widened considerably and masses of bornite were found enclosed in the sheetings of the rock. There is, now, comparatively little magnetite associated with the ore, which is for the most part chalcopyrite. The common gangue materials are quartzose matters and actinolite.

At Matilda creek, Ahousat, on a group of claims owned by Messrs. A. Watson and J. Ringland, a large body of pyrrhotite was cross-cut. Chalcopyrite is found in places associated with the pyrrhotite. The geological formation is similar to that of the copper belt at Sidney inlet.

"Work is being continued in the long cross-cut tunnel on the *Good Hope* mine, at Trout river.

"The ore bodies of the Trout River district of Clayoquot, as a rule, lie in lenses in the sheetings of the altered slates and in irregular masses in and near the limestones. In the latter the chalcopyrite is associated with magnetite and actinolite. The ore in the quartz lenses is arranged in a banded fashion, and consists of a mixture of chalcopyrite and pyrrhotite. The outcrops of these lenses mark a well-defined shear plane, which extends to a considerable distance across country, and although each individual lens in sight appears somewhat limited in size, in all likelihood the series will persist in depth.

"The usual annual assessment work has been performed at various points, but until the ore bodies are tested at depth nothing more can be said than that there are many promising surface indications of ore.

"The question is often asked, do the copper ores of the west coast carry gold values? Although it is undoubtedly dangerous to generalise at present, I can say from personal experience that of the couple of dozen of samples taken from various prospects, I have never obtained more than traces of gold—at most $2 per ton. I do not refer to such properties as the *Thistle*, in the Alberni District, but to properties confined to the West Coast Mining Division."

OFFICE STATISTICS

Free miners' certificates (individual)	98
" " (company)	1
Mineral claims recorded	78
Certificates of work recorded	166
Bills of sale, bonds, etc., recorded	89
Certificates of improvement recorded	12
Payments in lieu of assessment work	2
Placer claims recorded	4

Revenue.

Free miners' certificates	$ 528.50
Mining receipts, general	1,002.95
	$1,531.45

NANAIMO DISTRICT.

NANAIMO MINING DISTRICT.

REPORT OF MARSHAL BRAY, GOLD COMMISSIONER.

I have the honour to submit my annual report on the Nanaimo Mining Division for the year ending the 31st of December, 1901.

There were 633 mineral claims in good standing at the end of the year, and a great deal of development work has been done in different parts of the division, giving in many instances very good results.

TEXADA ISLAND.

The Puget Sound Iron Co. has leased the iron mine owned by it to the Pacific Steel Co., and this latter company has shipped 2,500 tons of the ore to Irondale during the year 1901, employing a force of 10 men.

The Puget Sound Iron Co. has done a considerable amount of work in developing its copper mine, and has shipped to the smelter some 300 tons of ore, while some 800 tons were on the dump on the 31st of December, 1901. On an average, 10 men were employed throughout the year.

Van Anda. The debenture holders of the Van Anda Copper & Gold Co. only worked their properties up to the 10th of July, 1901, at which date the mines were shut down pending negotiation for sale to the North-West Copper Co., which latter commenced operations on the 1st of October, 1901, under a bond and lease. The output made during the first part of the year from January to July, under the debenture holders, was rather meagre on account of a strike as the result of the introduction of Japanese muckers into the mines. The work done was as follows :—Custom ore smelted, 1,599.59 tons ; Van Anda ore smelted, 1416.41 tons. Development work on the *Copper Queen* mine, drifting 60 feet ; *Cornell* mine, shafting 100 feet, winze 55 feet, upraise 40 feet, cross-cuts 90 feet, drifting 160 feet. No new plant was installed by the debenture holders, and the average number of men employed by them for the time referred to was 31.

The North-West Copper Co., which has been working these properties since the 1st October, 1901, is getting a hoisting engine, new boiler and compressor plant installed at the *Cornell* mine and a new and more powerful hoisting engine will be put in at the *Copper Queen* mine.*

The *Marble Bay* mine has shipped 5,580 tons of copper ore during the year.

Development work for the year consisted of sinking 60 feet below the 200-foot level and drifting 468 feet.

The plant installed during the year was a 100 horse-power boiler, five drill Ingersoll air-compressor, with accessories complete, new ore sorting tables and grizzlies, while the pit head was raised, an elevated car track made, and the new machinery roofed in.

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*NOTE—The N.-W. Copper Co. has since thrown up the bond.

The average number of white men employed per day for the year was 59, and the average number of Chinese ore sorters was 9.

On the *Marjorie Group* of claims, owned by the Texada Gold Mines Co., and consisting of the *Marjorie*, *Wild*, *Fairview*, *Saga*, and *Tenas*, development work was begun in June, 1901, and a double compartment shaft sunk 70 feet deep. A considerable amount of stripping and trenching has been done on the ledge, and several exposures of rich free-milling ore have been made.

The Cap Sheaf Copper & Gold Co. has been steadily developing its properties during the year with very good results.

The Van Anda strike necessarily had a somewhat depressing influence on Texada island during the year 1901, and of course this has had an effect on the development work done. The prospects for the coming year are, however, encouraging.

Shoal Bay.

The *Shoo Fly* and *Nellie C.* mineral claims, at Shoal bay, have been bonded. The former is being worked for its iron ore and the latter is a copper and gold proposition. Both have developed excellent showings.

Considerable work has been done on Thurlow island during the year with very good results.

Discovery Passage.

The *Camp* and *Hard Cash* mineral claims at Chatham point have had considerable development work done upon them with very good results, the leads increasing in size with depth and the values also improving.

On the *Molly Gibson* group of claims at Menzies bay considerable development work has been done, about 150 feet of tunnel having been driven and the ledge, which shows good values in copper, encountered.

Phillips Arm and Frederick Arm.

Considerable development work has been done during the year in this section, the most important being that of the B. C. Exploration Company at Estero basin, on the *Colossus* group of claims, from which good copper values are obtained. The following work was performed:—1,560 feet of tunnels and drives and 160 feet of winzes and raises. On an average, 12 men were employed.

Considerable development work has been done on Toba, Bute, Loughborough and Knight's inlets during the year, with very gratifying results.

Cameron Lake.

The Copper King Mining Co. has extended its tunnel about 100 feet during the year, and has tapped the ledge, which is looking very favourable.

Dunsmuir District.

The principal development has been done in this district by the Jubilee company on its group of claims. The tunnel was extended 30 feet into the ledge and good assays in gold and silver were obtained. A shaft 40 feet deep was also sunk on another ledge. A good showing of bornite ore occurs on the property.

Black Sand.

Black sand carrying fine gold has been worked at Cape Commerell with good profits during the year, and no doubt when proper appliances are installed it will yield rich returns, as there is a large deposit between this headland and Shushartie bay.

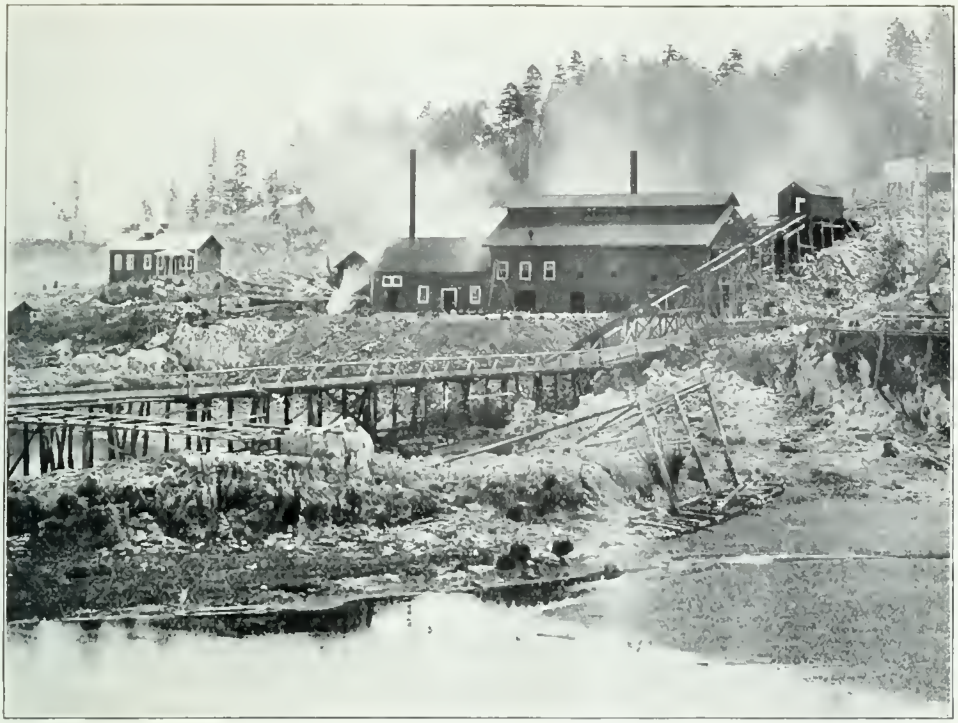
The mineral claims located and recorded during the year ending the 31st of December, 1901, were situated in the following places throughout the Nanaimo Mining Division, viz.:—

Texada Island	124	claims	recorded.
Menzies Bay and Chatham Point	7	〃	〃
Hanson, Thurlow and Hawatsis Islands	5	〃	〃
Valdes Island	8	〃	〃
Harbledown and Cracroft Islands	4	〃	〃
Campton and Deer Islands	2	〃	〃
Powell Lake	2	〃	〃
Port Neville	1	〃	〃
Theodosia Arm and Malaspina Inlet	5	〃	〃
Jervis Inlet	2	〃	〃
Phillips Arm	13	〃	〃
Toba Inlet	1	〃	〃
Loughborough Inlet	5	〃	〃
Knight's Inlet	5	〃	〃
Quinsam River	2	〃	〃
North Coast of Vancouver Island	1	〃	〃
Cameron Lake	1	〃	〃
Nanoose District	3	〃	〃
Wellington District	3	〃	〃
Dunsmuir District	37	〃	〃
Oyster District	1	〃	〃
Bright District	11	〃	〃
	——	〃	〃
Total	243	〃	〃

Office Statistics, Nanaimo Mining Division, for year 1901.

Free Miners' Certificates issued	300
Mineral Claims recorded	243
Placer Claims recorded	2
Mining Leases, Placer, issued	3
Certificates of Work recorded	335
Paid $100 in lieu of work	3
Certificates of Improvements recorded	17
Crown Grants issued	17
Bills of Sale recorded	64
Abandonments recorded	*Nil.*
Water Grants issued	1
Crown-granted Mineral Claims not working paid the annual tax	29

The revenue collected for Free Miners' certificates and Mining receipts generally for the year ending the 31st of December, 1901, was $4,725.47; and to this amount must be added the Mineral taxes collected for the year, namely $889.82, making a total of $5,615.29.



VAN ANDA SMELTER.

CORNELL MINE, TEXADA ISLAND.

NANAIMO MINING DIVISION.

Report of H. Carmichael, Provincial Assayer.

I have the honour to report that, acting under instructions, I visited all the principal metalliferous mines in the Nanaimo Mining Division with the exception of those situated near the Nanaimo lakes, the examination of these last having to be deferred. The Van Anda and Marble Bay mines on Texada island were examined in 1899 and the work done on these properties since that date is here noted. None of the quartz properties in the neighbourhood of Shoal bay were in operation when I was in that section and were not, therefore, examined.

Nanaimo Mining Division has a very extensive coast line compared to the area of land included within its boundaries. This is due to the numerous inlets indenting the mainland coast, several of them extending 50 miles inland, and to the wonderful archipelago adjacent to Johnstone strait and the Strait of Georgia. Thus at no point are the mines at any great distance from salt water, while, protected from the storms of the Pacific ocean, there is an immense inland sea which renders possible cheaper transportation of their products than exists anywhere else in British Columbia. This will be a great factor in the development of the district, and very low-grade ores will undoubtedly be profitably mined, added to which there is cheap coal and timber, while water powers are available in nearly all parts of the division.

Geology.

A portion of the coast line of this division was examined in 1885 by the late Dr. Dawson, and where his observations referred more particularly to the geology affecting the metalliferous mines they have been quoted in full.

Since Dr. Dawson's visit considerable development work has been accomplished, and this naturally leads to some speculation as to the mode of occurrence of the ore bodies.

It is a fact that in the majority of the properties being worked to-day in this division the ore is found to lie in felsite or allied rocks. The best-known mines of this class are the *Cornell*, *Copper Queen* and *Marble Bay*, and the underground work, which is extensive, has proved that here the ore exists in felsite dykes occurring in limestone of the Vancouver series. These properties are situated at or near the contact of the vast granitic masses of the mainland and the rocks of the series mentioned, and similar contacts occur on Valdes island, on Vancouver Island above Seymour narrows, and on Hardwick and Cracroft islands. At these places outcrops of bornite and copper pyrites have been found, but not as yet in any quantity.

From the following quotation it will be seen that Dr. Dawson believed these dykes to be derived from the granite. He says: "The edge of the Vancouver series is also, for some distance from the contact, very generally shattered and penetrated by granitic spurs, or by felsite dykes which probably represent granites in a fine-grained slate." Should this prove to be the case, as seems likely, further prospecting along this contact might result in the discovery of other valuable ore bodies occurring in a similar manner.

Johnstone strait would appear to form the south-western line of contact between the Vancouver Island series and this vast granitic mass. The north-eastern boundary of this granitic area, while undoubtedly extending much further inland than the portion of the coast examined by Dr. Dawson, is still entirely unexplored and awaits the prospector and geologist.

What would at first sight appear to be fissure veins are of frequent occurrence in the rocks of the Vancouver series, but it is probable that the majority of these will prove to be lenticular cavities with a secondary quartz filling, and while it is possible that a single lens may yield ore sufficient to make it a paying property, there exists here a trap for the unwary miner in developing what he supposes is a true fissure vein, and sinking or drifting for a wider or more mineralised lead which does not "materialise."

The following extract is taken from a report of the late Dr. Dawson, Geological Survey of Canada:—

"By far the greater portion of the area of the northern portion of Vancouver Island is occupied by rocks of volcanic origin, which at first sight, and as judged by Eastern American analogies, might often be supposed to represent formations occupying a very low stage in the geological scale. These volcanic rocks, originally composed of minerals already crystalline, have since been subjected to metamorphism more or less intense, to which, in consequence of their composition, they have easily yielded, and now form, for the most part, rocks which might be spoken of as 'traps' and 'greenstones.' These frequently show, locally, little or no evidence of their bedded character. Such rocks, however, when closely examined, and followed from point to point, are found to form portions of a stratified series of great thickness, which includes, besides the preponderant volcanic materials, certain argillites and limestones, holding triassic fossils.

"The greater part of this old volcanic series appears to have been built up of basaltic and trachytic lava flows, alternating with rough volcanic breccias and tuffs, largely composed of fragments from such flows. These rocks are now represented by hard amygdaloids and agglomerates of general dark greenish colours, though often grayish and sometimes purplish or reddish; by felsites, more or less porphyritic, and by hard, regularly stratified ash-beds, which, where the alteration has been most pronounced, are locally changed to hornblendic or micaceous schists.

"A microscopical examination of a limited number of specimens of these volcanic rocks, selected as characteristic, shows that they may now be classed generally as diabases and felsites, with occasional examples of diorite. These have, however, been subjected to so much alteration subsequent to the first mineralogical changes, that the feldspars are almost invariably much decomposed, and few of the other crystalline minerals are unaffected. It is to the development of various green minerals as alteration-products during this secondary change that the characteristic tint of these altered volcanic rocks is largely due.

"It is worthy of remark that in several somewhat widely separated localities, a few of which are specially noted in the sequel, the original 'ropy' structure, frequently found on the surface of modern lava beds, has been well preserved in these old volcanic rocks, notwithstanding their great alteration. This structure is, of course, now only clearly apparent where the surface of an old lava has been covered by some ashey or calcareous material, which has subsequently been removed by weathering.

"The rather frequent occurrence of disconnected flattened or lenticular masses of crystalline quartz, or quartz and feldspar, in massive green or diabase rocks, giving them a blotched appearance, was at first a somewhat puzzling phenomenon. These are not of the character of segregations from the enclosing rock, but would seem to represent the position of former cavities and interspaces in breccias, or the brecciated surfaces of lava flows which have become filled with zeolitic or chalcedonic materials, which have subsequently passed into their present state during the metamorphism of the formation.

"In association with these volcanic rocks, limestones, argillites and quartzites occur, possibly at several different horizons, but one of these, which is of considerable thickness and great persistency, and possesses very distinctive characters, has now been recognised at a number of places, from the northern part of the Straits of Georgia round the north end of the island

and in Quatsino Sound. This intercalated zone is of considerable thickness, having been estimated at 2,500 feet at one place on the north coast of the island, where it appeared to be fully displayed. Massive limestones which, when the strata are considerably altered, pass into marble, form its lower portion. The upper portion of the limestone becomes imbedded with argillites in regular flaggy layers, and black flaggy argillites, imbedded with quartzites, overlie these. Where the top of this argillite series is seen it often holds tufaceous and fine agglomeritic beds, and is followed in ascending order by a great thickness of the altered volcanic rocks. In other localities the limestone is found to become imbedded with volcanic materials beneath, and though no complete section of the series can be offered, it is quite clear from observations made in a great number of places, that these sedimentary materials form an intercalation in the great volcanic series. The series, as a whole, indicates a continuance or recurrence of volcanic phenomena on an enormous scale, and must be at least several thousand feet in thickness.

"As a convenient distinctive name for the whole, I shall employ the term 'Vancouver Series,' including, for the present, under this name, not only the entire mass of volcanic materials which unconformably underlie the cretaceous, but also the interbedded limestones and flaggy argillities and quartzites. The beds in the Vancouver series are the oldest known to occur in the district, and are frequently found in contact with, or resting upon, granite rocks. They have not, however, been deposited upon a granite floor, as the granites are evidently of a later date than the rocks of the Vancouver series, and nothing whatever is known of the character of the surface upon which its volcanic and other associated beds were originally formed.

"The relations of the granites to the rocks of the Vancouver series is peculiar, and appears at first sight to be of a very anomalous character. The position of the exposed areas of exposed granite, so far as determined, is shown on the map, and it may be added that the granites there indicated, with the exception of certain isolated patches, form merely the south-western border of the great granite region of the Coast ranges of the mainland.

"The circumstances attending the line of junction of the granites with the rocks of the Vancouver series have been carefully examined at a great number of points. The granites near this line are usually charged with innumerable darker fragments of the Vancouver series, which, when in the immediate vicinity of the parent rocks, are angular and clearly marked, but at a greater distance become rounded and blurred in outline, and might then be mistaken for concretionary masses in the granite, into the substance of which they have been in process of being absorbed. The width of the belt characterised by these fragments is very variable, and where the plane of the present surface cuts that of the two classes of rock at an acute angle—as is often the case—it is considerable, frequently exceeding half a mile. In other cases, the fragments are scattered out into the granite for a few hundred feet only. It was in several instances found impossible to draw a distinct line between the granites and the Vancouver rocks, except on the assumption that this line should run where the two materials are blended in nearly equal proportions.

"The edge of the Vancouver series is also, for some distance from the contact, very generally shattered and penetrated by granite spurs, or by felsite dykes, which probably represent the granites in a fine-grained state.

"If the granite merely formed limited intrusive masses in the Vancouver rocks, no difficulty would be found in accounting for the above facts, but the circumstance that it appears everywhere to be the material upon which these rocks rest, and that it is, nevertheless, evidently of later date than these rocks, appears to call for some special explanation. The only explanation which appears satisfactorily to account for the appearances met with is, that in consequence of upheaval and denudation we now have at the surface a plane which was at one time so deeply buried in the earth's crust that the rocks beneath it had become subject to granite fusion or alteration. The present surfaces, therefore, have been either covered to a very great depth by beds accumulated in regularly superposed layers, or the strata must have been heaped together by folding to such a depth that the lower parts of the whole were affected by such granitic fusion, which was gradually progressing upwards through the mass, incorporating the rocks of the Vancouver series as it went. It is clear that the granite rocks beneath were in a plastic condition, not alone from the fact that they are found to penetrate the older series, but also from the evidence found everywhere of the scattering out of fragments of the stratified rocks into the granites.

"Both the granites and the rocks of the Vancouver series have been subjected to great pressure in a horizontal direction, causing the fragments in the agglomerates to assume lenticular forms, and impressing more or less distinctly schistose character upon them, while the dark included fragments in the granites have been squeezed out in sheets, giving the portions of these rocks which are characterised by an abundance of such fragments an almost gneissic lamination. At the time at which this effect was produced, the granites must still have been in a plastic state. Isolated masses of the volcanic rocks which have been included in the granites are occasionally found in a highly crystalline schistose state. In a few places within the granite area, distinctly gneissic rocks were noted. These may either be still more highly altered portions of the Vancouver series, or may be the result of a foliation superinduced in the granite itself. There is little or nothing to indicate that they represent remnants of any older distinctively gneissic formation.

"As is fully stated in following pages, the granites are almost always hornblendic and generally gray in colour. They, however, in many places, hold so little quartz and so large a proportion of hornblende, that they become quite dark in colour and resemble diorites, with which indeed at times they may be classed. Though granitoid rocks, differing somewhat in composition, occasionally meet along pretty definite lines, they more frequently blend imperceptibly. It appears highly probably that the local character of the beds, passing into a state of granite fusion, may account for such differences."

VAN ANDA MINES.

Van Anda.

These properties, owned by H. W. Treat and others, are situated on the north-east side of Texada island, and are now under bond to the North-West Copper Co., Limited.

This group of mines was visited by me during the summer of 1899, and it is only intended to describe the work done since that date.

Copper Queen.

The main shaft of the *Copper Queen* has been sunk to the 500-foot level, and a drift run west for 195 feet along a diorite and lime contact, the lime lying to the north. At 140 feet in the diorite was passed and the felsite with ore came in.

At this point a cross-cut was run south which disclosed a vein about 8 feet wide, mineralised with high-grade bornite and with a foot-wall streak of 4 feet wide. In upraising for 20 feet these two ore bodies came together and extended unbrokenly to the 400-foot level. The length of the ore body above this point was between 50 and 70 feet, and was well in place, showing distinct gouge matter on the walls and being better defined than in the upper levels. At the 400-foot level the ore body near the shaft has been stoped to the 300-foot level.

At the old shaft an open cut has been run east about 30 feet on the felsitic vein and shows ore on the face. From the same shaft, on the 60-foot level, a drift was run west which shows a clean lime hanging-wall and a diorite foot-wall, the enclosed matter being felsite fairly well mineralised. Another drift has been run east on this level on the same contact, carrying felsite and good ore all the way.

Cornell Mine.

Since this property was reported on in 1899 the mine has been opened out on three levels, viz., the 80-foot, the 160-foot and the 260-foot.

A cross-cut tunnel was run from the surface through 100 feet of diabase and 41 feet of felsite to a lime contact running east and west.

From this tunnel a drift was started to the west for 75 feet along the contact, and a cross-cut run 50 feet through felsite to a diabase foot-wall. This developed an ore body lying on the foot-wall, with a lime hanging-wall, and having an average width of 12 feet and a length of 160 feet. The mineralisation of this ore body consists of good grade copper pyrites with occasionally bornite dispersed through a felsitic gangue.

This ore chute has since been stoped to the surface. A winze was sunk on the lime hanging-wall 50 feet, and a cross-cut run to the diabase foot-wall; this cross-cut is in ore. The main cross-cut tunnel was continued into the lime 65 feet to prospect for a parallel vein, but none was discovered.

At 140 feet in on the main cross-cut tunnel another drift was run to the east on the lime contact for a distance of 160 feet to connect with the No. 1 shaft. This drift cut through an ore body 12 feet wide, carrying principally high-grade bornite, and was continued along the contact for 80 feet. The body of ore thus disclosed has been stoped to the surface, showing a regular lime hanging-wall.

At the west end of the vein, at the 80-foot level, a working shaft has been sunk to the 160-foot level and continued to the 260-foot level.

At the 160-foot level a drift has been run 90 feet to the east, following the ore body disclosed on the level above. This ore chute is of irregular shape and has an average width of 15 feet. A drift had also been run following a well-marked lime hanging-wall which developed the ore body on a diabase foot-wall. The ore was reached at 70 feet from the shaft, and has a width of about 12 feet, the mineralisation being bornite and copper pyrites.

At the time of my visit a winze was being sunk along the diabase foot-wall, and had attained a depth of 30 feet. This winze showed a fair-sized body of high-grade ore, and was still in this at the time of my visit. On the same ore body an upraise was being driven to the 80-foot level.

The west end of the ore chute, on the 160-foot level, had been stoped to the surface and showed a well-marked wall all the way. At the west end of the same level a cross-cut was being run through the diabase foot-wall to develop an outcrop lying to the west of the shaft.

At the 260-foot level a drift has been run 140 feet to the east on the lime-felsite contact, being in the same ore body as seen in the upper level. At 50 feet from the shaft a cross-cut was run south to locate the diabase foot-wall, which was done at a distance of 20 feet, and at 85 feet from the shaft a cross-cut was being run north to strike the ore body under the winze mentioned on the 160-foot level. At the time of my visit this cross-cut was in 40 feet, and, I am informed, has since reached ore

The ore chute on the 260-foot level has been stoped for 3 sets up, and has a width of about 3 feet.

The ore body of this mine is a mineralised felsitic dyke with well-marked contacts. One of the walls is lime and the other a fine-grained diabase of evidently later origin. The felsite is mineralised with chalcopyrite and bornite, the mineralisation occasionally penetrating a short distance into the limestone, but for the most part showing a sharp contact therewith.

The trap dykes are very regular, showing a clean contact with either felsite or lime, and in some places considerable movement is evident; the only mineralisation in the trap dykes is a slight sprinkling of barren iron pyrites.

The best ore has been shipped to the company's smelter, but there is a large dump of second-class stuff, which it will undoubtedly pay to treat as soon as better facilities are provided.

Marble Bay Mines. This group consists of the *Marble Bay*, *Marble Bay Fraction No. 1* and *Marble Bay Fraction No. 2*, lately owned by J. J. Palmer *et al.*, but now sold to a syndicate represented by Hewit and McIntyre, of Tacoma. The property is situated on Marble bay, adjoining the *Van Anda Group*, and was described by me in the Mining Report of 1899, since when the mine has been worked continuously, and the development described below has been done.

The mine is worked by a vertical shaft, from which levels have been started at convenient distances, following the irregular felsitic dyke which carries the ore. On the different levels the mineral-bearing felsite has been found fairly well in place. The ore body has the appearance of one main chute, faulted along what are locally known as mud slips, which undoubtedly extend to the surface as the water comes down them much more in wet weather, in fact this is one of the difficulties with which this mine has to contend.

At the 70-foot level there are 600 feet of drifting, and the upraise, which was begun on the west drift in 1899, has been carried to the surface. No other work has been done.

At the 140-foot level two principal drifts have been run, one to the south for 200 feet, following a mud slip with felsite occasionally appearing on the east wall, and which, in one place, has been cross-cut for 15 feet. On the north side of the 140-foot level the main drift has been run a distance of 150 feet, following a mud slip which took a turn to the east when another slip was encountered, which was followed to the north; here an ore body in felsite, of a considerable size, being 25 feet wide and 60 feet long, was reached, and has been stoped to a height of 80 feet. When the second slip was cut it was followed back a distance of 25 feet, and an ore body reached which was stoped to the 70-foot level. Several short drifts were run to the west of the main drift on the 140-foot level, but though sometimes in felsite no ore body of any extent was encountered.

At the 200-foot level a drift has been run to the north for a distance of 120 feet, following the mud slip mentioned on the 140-foot level. A small body of ore was struck at 30 feet from the shaft, but the main body was reached at 100 feet, and is about 50 feet long by 10 feet wide. This has been stoped for 40 feet.

On the same level a drift was run to the south 160 feet, and the main ore body reached at 10 feet from the shaft. This ore body is about 30 feet wide by some 60 feet long, and has been stoped to a height of 40 feet.

Beyond the ore body to the south of the shaft two drifts have been run a distance of 50 feet. These are in felsite, but no ore in any quantity was struck. The management intended prospecting in this direction as soon as machine drills were available, the present work on this level having been confined to stoping.

At the 260-foot level drifts are being run from the shaft following the course of the slips mentioned on the levels above. At the time of my visit the north drift was in a distance of 40 feet, where ore was reached, and at 25 feet in on the southern drift ore was also struck, but the direction of the slip and of this ore body appears to be east and west, and a drift, which was in ore at the time of my visit, was being run to the west to find the strike of this body. No stoping had yet been done on this level.

In this mine the rule has been to follow the mud slips, which occur at the contact of the felsite with lime, though occasionally what appear to be later slips occur in the felsite itself.

The best of the ore has been hand sorted and shipped to the Van Anda smelter, and there were about 4,000 tons of second-class stuff on the dump, which, I was informed, had an average value of $12 per ton.

Some experiments in concentrating this ore, the success of which seems problematical, were being made with a Hartz single-compartment jig, and a 150-ton concentrator has been purchased. I was informed by the management that the first-class ore runs on the average $27 per ton.

Commodore and Leadbank Mineral Claims.

These claims, owned by R. A. Swan, of Van Anda, and situated some 3 miles from the latter place, at an altitude of 120 feet, are reached by the Iron Mine waggon road. A small broken quartz vein, slightly mineralised with copper pyrites and galena, has been traced for a considerable distance on the surface by a series of prospect holes. The strike of this vein is north and south, but sufficient work has not been done to determine the dip. The west wall is a quartz porphyry and the east limestone. There is also a quantity of breccia, composed of white quartz cemented by limestone.

Planta Group.

This property, owned by the Texada Gold Mining Company, Ltd., is situated some two miles west from Van Anda, at an altitude of 150 feet. A small quartz vein, which carried exceedingly high values in free gold, was discovered by the locators, and a company was formed to work the property.

On the surface two small quartz veins have been uncovered, one 22 inches wide, having a strike N. 40° E. and a dip nearly vertical, while 20 feet to the west and parallel to the former is one 20 inches wide, which has been prospected by an open cut 4 feet by 50 feet long and 15 feet deep at the lowest point. This open cut shows a regular vein of white quartz sparsely mineralised with iron pyrites.

On the 22-inch vein a shaft was being sunk, and at the time of my visit had attained a depth of 50 feet. The vein becomes frozen to the wall at a short distance from the surface and the mineralisation, which consists principally of pyrites, becomes small.

The walls are diorite and frozen to the vein, but on the west side fairly well defined. At the bottom of the shaft the vein shows a width of 16 inches of rather barren looking quartz.

There is a waggon road to the property and good bunk-houses have been provided a short distance from the mine.

Iron Mine.

This mine, situated on the west side of Texada island, was visited by me in 1899, when work was confined to running a drift into the mountain from the bottom of the 150-foot shaft. The object of this drift was to prove the continuity with depth of the massive outcrop of magnetite seen so conspicuously on the surface. The drift has been run into solid magnetite and work in this direction suspended.

A little to the north-west of the shaft open quarrying has developed on the hillside a large face of magnetite, some 50 feet wide and 125 feet deep, occurring mainly between a contact of lime on the west side and a grayish white granite on the east, with some felsite on the east wall.

The ore is solid magnetite, but contains a small percentage of iron pyrites, and in some places is traversed by numerous secondary veins of calcite.

Arrangements have been made to transport the ore by a gravity tramway, 1,100 feet in length and 500 feet above sea level, and the owners, the Puget Sound Iron Co., Ltd., intend making regular shipments to the smelter at Irondale in the State of Washington, so that the property bids fair to become of considerable economic importance.

There has been considerable discussion as to the formation of this magnetic iron ore body. Development work would appear to show that it has been formed at the contact of the intrusive granitic mass which extends across the island and the rocks of the Vancouver series. Other similar outcrops have been found along the line of contact and to a certain extent worked, notably at the *Security* and *Raven* mines.

Copper Mine Mineral Claim.

This property, owned by the Puget Sound Iron Co., is situated at an altitude of 600 feet. on the south-west side of Texada island near Gillies bay, about one mile east of the Iron Mine shaft and half a mile from salt water. The ore appears to be carried in one of the felsitic dykes so common at the north end of Texada island, but occurs in more solid and distinct bunches and not so evenly disseminated through the felsite as in the *Marble Bay* and *Cornell*.

The felsitic dyke has been prospected by 140 feet of open cut running into the hillside and at the face has attained a depth of about 30 feet. The strike is north and south and the dip, as far as shown by the development work done, is nearly vertical, the east wall being lime and the west a fine grained diabase.

The ore (copper pyrites) occurs in a gangue of felsite associated with epidote and heavily charged with magnetite. The values are reported to be 10 % copper, 3 oz. silver and $1 gold. Some 500 tons have been shipped to the Van Anda smelter.

The development done has shown an outcrop of good copper ore with more ore in sight at the face of the open cut. but further work is necessary to prove the extent of the ore body. The property is well situated for easy and cheap shipment.

Loyal Group.

This group, consisting of seven claims, viz., *Garland*, *Loyal*, *Unicorn*, *Birch Fraction*, *Copper No. 3*, *Jumbo* and *Tiger*, and owned by H. W. Treat *et al.*, is situated on the north-east shore of Texada island, a short distance south of the extreme north end.

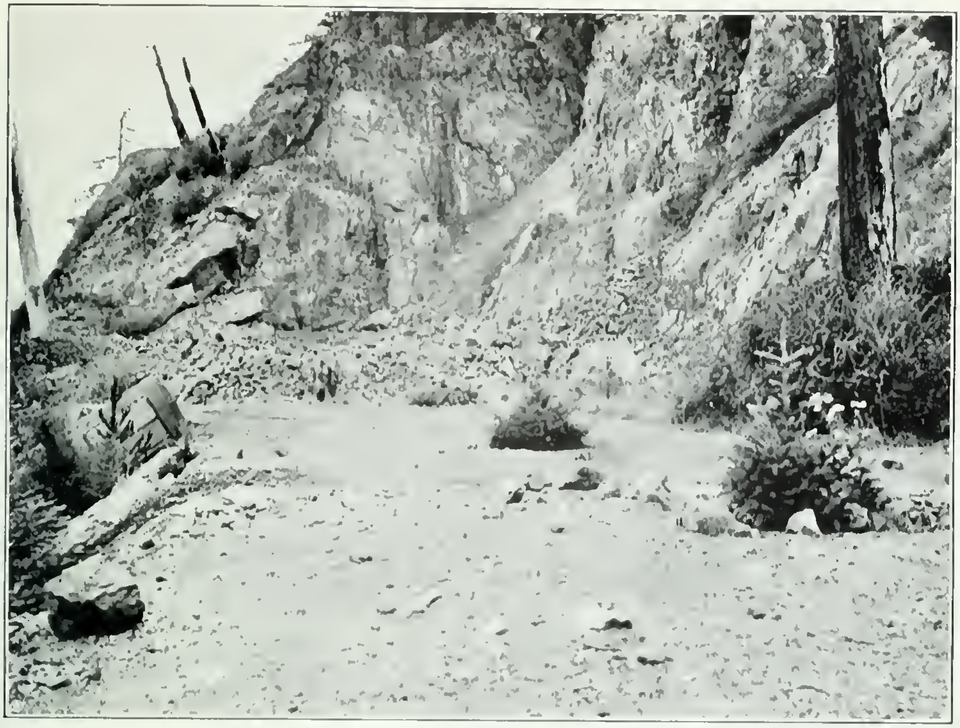
At the beach there is a small ore bunker and loading chute, and a short distance back from this point an open cut has been started and continued for a distance of 200 feet into the gradually rising ground. At the end of this cut the face has a height of some 15 feet and has also been extended a few feet on either side.

There is no ore to be seen in the open cut except at the face, where there is a small outcrop of felsite carrying copper pyrites.

From the open cut a tunnel was started which cross-cuts the outcrop just mentioned, and passes into lime. This tunnel runs N. and S. for 50 feet, being in lime for the entire distance until just at the face where there appears to be a lime-felsite contact.

On the west side of the tunnel near the mouth, a shaft has been sunk 30 feet and from the bottom of this a drift has been run N. E. in limestone for 19 feet. A cross-cut has then been driven 19 feet north-west until a lime and felsite contact was reached. This contact was followed in both directions for a total distance of 30 feet, but no ore in any quantity was encountered. In a southerly direction, about 1,000 feet from the shaft, a number of good outcrops of bornite and copper pyrites have been uncovered and prospected by some shallow open cuts. These outcrops occur along a well-defined felsitic dyke at a diorite and lime contact, their general strike being N. 40° W. with a westerly dip. The outcrops at this point would appear to justify more extensive development work.

Along the shore line adjacent to this group the rock is much jointed and traversed by numerous greenish felspathic and blackish diabase dykes.



IRON MINE, TEXADA ISLAND.

MARBLE BAY MINE, TEXADA ISLAND.

Paris Group.

This property is situated at Blubber bay, at the north end of Texada island. The group consists of seven claims, *Paris*, *Two Friends*, *Copper Prince*, *Tidewater*, *Copper*, *Northern Light* and the *Oro*, and is now under bond to T. G. Holt, of Vancouver. The first workings at the upper or No. 2 shaft are less than half a mile from salt water, and are situated at an altitude of 180 feet. The descent is gradual from here to the water's edge, while above the shaft the ground also rises gradually upwards for some distance. At some 1,300 feet in a south-easterly direction from the beach a shaft has been sunk on a felsitic dyke carrying copper pyrites. At the time of my visit this was full of water, but I was informed that it had been sunk to a depth of 40 feet, and drifts then run N. E., S. W. and S. These disclosed two ore bodies occurring on a lime and chloritic schist contact. The ore has been traced from this latter shaft, in a southerly direction, for 650 feet to No. 2 shaft.

No 2 shaft has been sunk 40 feet, but no means were available for examining it. I was informed that it passed through a mixture of felsitic and diabasic rock carrying some copper, and that it cut a streak of solid chalcopyrite. On account of excessive rains in winter this shaft was abandoned, and a tunnel driven for 175 feet to the lime and diorite contact, at a depth of 73 feet from the surface. Ore is reported to have been taken out at this point, but very little is now in evidence.

A drift was also run on felsite 20 feet to the south, from whence a cross-cut was run east and west, a total distance of 40 feet. This cross-cut is in diorite, with lime showing at the east end.

No. 3 shaft has been sunk on the felsitic ore body between Nos. 1 and 2 shafts, and was also full of water when I visited the property. I was told that it had been sunk vertically for 50 feet, passing through 8 feet of clean ore, but ran off the ore body at a depth of 25 feet, on account of the vein dipping to the eastward with the limestone. The ore was visible for some distance, but was eventually lost, though some bunches can still be found at the bottom of the shaft.

The ore occurrence in this group appears to be similar to that existing in the Van Anda and *Marble Bay* properties, viz.:—A felsitic dyke occurring in limestone, and carrying copper sulphides with gold and silver values, though in this instance it would appear to be more broken up by later movement and the intrusion of diabasic dykes. Epidote and quartz porphyry are much in evidence.

Redonda Iron Mine.

This property was located as the *Elsie* mineral claim in 1892, and was Crown-granted by De Wolf & Monro, of Vancouver, in 1895. It is now under bond to Hewit & McIntyre, of Tacoma.

The mine is situated on the north shore of West Redonda island, about S. 11° W. from Elizabeth island in Pryce channel. The north shore of the island rises very abruptly from the sea to a height of over 3,000 feet, and is entirely composed of gray hornblendic granite, generally notably coarse in grain, and occasionally porphyritic, and in some places holding dark, highly hornblendic portions. The outcrop of ore is situated at an altitude of 450 feet, and so rapid is the rise that the mountain side could not be climbed if it was not for the foothold afforded by the standing timber. A clearing was made at this elevation and, during the year 1893, 626 tons of magnetic iron ore were taken out and shipped to the Oswego Iron & Steel Company's furnace in Oregon. This work has exposed an open face of solid magnetite 30 feet wide by about the same height. The ore lies between limestone and an intrusive light gray granite, with the walls well defined : strike, N. and S.; dip, 65 E. I was unable to form an opinion as to the continuity of the ore body with depth, as the solid ore disappears beneath the loose ore at the bottom of the cut. The surface all around this outcrop is heavily timbered, and no further work has been done to uncover the ore body than the open face just mentioned.

A short distance below is an ore bin and a chute to the beach, but these are now quite rotten. The water is very deep right up to the beach, and steamers of any size could be easily loaded from a floating wharf.

Colossus Mine. This mine is reached from Frederick arm, which has weekly steamboat communication with Vancouver. At the head of this arm is a deep inlet called Estero basin, connected with the former by a shallow channel which might be called a reversible river, flowing out when the tide is falling and in when the tide is rising. From this inlet to the mine there is a good trail some two miles long and steadily rising till an altitude of 1,300 feet is attained.

At this elevation, on the face of a high bluff, an outcrop of copper ore is seen, and on this a tunnel 200 feet long has been driven with cross-cuts of 75 and 80 feet on either side. These workings have developed a vertical zone of considerable movement, filled with shattered granitic rock matter well mineralised in places with bornite and copper pyrites, but at no point do there appear to be any well-defined walls, and the ground is traversed by diabase dykes.

At 88 feet below the upper tunnel another tunnel was driven for 250 feet to explore the same mineralised zone, which was found at 150 feet in with a flatter dip into the mountain. One hundred and fifty feet of drifting was done on this level, and some well-mineralised quartz was cut in the main tunnel, but the general character of the ground is the same as in the level above, to which an upraise has been driven and is reported to be in mineralised quartz most of the way.

In these workings the management were much troubled with water pouring through the shattered zone mentioned, aud in order to afford drainage to the mine and to work it more economically, it was decided to drive a long tunnel on a level 164 feet lower.

This was in progress at the time the property was visited, and was then in a distance of 1,100 feet, having been run through solid granite traversed by diabase dykes. When the drift got below the upper working, movement became apparent in the rock, water coming freely through the shattered zone of crushed granite, but although the tunnel had been driven for some distance past this, no ore was visible.

Work in this direction had been discontinued and an upraise was being driven to the workings above, which had attained a height of 40 feet, but no ore had yet been struck.

I have since been informed by the management that a drift was run from the upraise into the mountain, and the ore again found, the ore body having flattened considerably between the two levels. The management state that they have now a large quantity of ore blocked out, having an average value of $16 per ton in gold, silver and copper.

The mine equipment consists of a 4-drill air compressor and plant, which was in good working order.

The property is owned by the B. C. Exploration, Ltd., of London, Eng., which is represented in this country by Mr. J. Argall.

Sunset Group. This group, owned by Radley & Shaw, of Vancouver, consists of six claims and a fraction, viz.: *Sunset*, *Molly Gibson*, *Adam*, *Protection*, *Volunteer*, *Harbour* and *Harbour Fraction*. With the exception of the fraction all are full claims, and Crown grants have been applied for.

The property is situated about a quarter of a mile back from Brown's bay, immediately above Seymour narrows, and the outcrop on which the first work was done is reached at an altitude of 715 feet. At this point there is an outcrop of quartz having a strike N. W. & S. E. and a vertical dip. A short tunnel was driven along the east side of this showing, terminating in a cross-cut of six feet, which ran through the vein matter into the country rock, an amygdaloidal diabase.

The outcrop, which is about 3 feet wide, occurs along a slip-wall, well marked although frozen and considerably mixed up with the country rock on the west side. The structure would indicate that it had been formed during a period of considerable movement, as the quartz encloses an even greater mass than itself of the surrounding rock, these enclosed masses often retaining the sharp angles they had when broken off. This vein matter is well mineralised in places with chalcopyrite and bornite, and, I was informed, yielded an average of 6% copper.

A short distance down the hill an open cut discloses the same slip-wall and quartz as above, with an equal width of vein matter. Some 66 feet vertically below the upper workings and along the slip-wall mentioned, a second level has been driven a distance of 122 feet, but the quartz at this point had only a width of one or two inches. To see if this would improve with depth a winze was sunk at 70 feet from the mouth to a depth of 28 feet, and another winze at 100 feet from the entrance was sunk 30 feet. Unfortunately, at the time of my visit, these winzes were full of water, but I was informed that the vein matter had widened out to between 3 and 4 feet. This was further proved by drifts from the bottom of each winze of 8 feet on both sides. The ore on the dump from this level was mineralised with bornite and copper pyrites, and I was told carried the same values as above.

To avoid water a third level has been started 200 feet below the second level, and at the time of my visit was in a distance of 256 feet, being run in the same direction as the one above, viz.: N. 40° W. At 189 feet from the mouth of the tunnel what may be called the slip-wall, seen in the upper working, was struck. Though no quartz was to be seen, considerable movement is evident and a number of cross slips have been encountered.

The manager informed me that when the tunnel is in the distance of the first winze in the level above, an upraise will be made to it in order to connect the workings.

The quartz outcrops at this mine do not present the features of a fissure vein but rather that of a lenticular quartz mass formed during a period of considerable movement in the surrounding rock, and are of the character described by the late Dr. Dawson. His remarks are quoted below and refer to this particular neighbourhood:—

"The rather frequent occurrence of disconnected flattened or lenticular masses of crystalline quartz, or quartz and feldspar, in massive, green diabase rocks, giving them a blotched appearance was at first a somewhat puzzling phenomenon.

"These are not of the character of segregations from the enclosing rock, but would seem to represent the position of former cavities and interspaces in breccias, or the brecciated surfaces of lava flows which have become filled with zeolitic or chalcedonic materials, which have subsequently passed into their present state during the metamorphism of the formation."

Cracroft Island.

Across this island would seem to run a contact between granite and the older rocks of the Vancouver series, and where this occurs there is a considerable indication of mineral. Very little prospecting work has been done, and the claims so far located have not shown up any extensive ore bodies.

The *Lone Star* mineral claim, a prospect owned by Bucknell & Johnson, is situated at Baronette passage, on the north shore of Cracroft island, close to the water. Two prospect holes, about 20 feet deep, have been sunk on a slip-wall in a dark diabasic rock slightly mineralised with bornite. Between these two holes, which are some little distance apart, there is a slight bornite mineralisation, but no ore in any quantity was to be seen.

The *Copper Queen* mineral claim, having the same owners as the *Lone Star*, is situated about a quarter of a mile west of that claim and some 150 yards from Baronette passage, at an altitude of 200 feet. A prospect hole 12 feet deep has been sunk on a slip-wall in a diabasic rock mineralised with bornite and copper pyrites. There are some other outcrops in the neighbourhood, but none showing any quantity of ore.

The *Welcome Home* mineral claim is situated on the south side of Cracroft island, on the south shore of Johnstone straits, at an elevation of 60 feet above the beach. A prospect hole and shaft 40 feet deep have been sunk on an amygdaloidal diabase. I was unable to find any mineral on the surface except some copper stain at one point. The bottom of the shaft was full of water.

VICTORIA DISTRICT.

VICTORIA MINING DIVISION.

Report of W. S. Gore, Gold Commissioner.

I have the honour to submit herewith the annual report on mining operations in this division for the year ending 31st December, 1901.

I have to thank Mr. J. H. Whittome, of Duncans, B. C., for information regarding Cowichan and the surrounding district, and Mr. E. C. Musgrave, Superintendent of the *Tyee* mine, for his report on the properties owned by the Tyee Copper Company, Limited.

Mounts Sicker and Brenton.

This camp is undoubtedly the most promising (from present indications) in this division, and has two shipping mines the *Lenora* and *Tyee.* Of the former I can give little more information than was contained in last year's report, beyond the fact that a large quantity of ore was shipped during the past year and the extension of the railway from the mine to Osborne bay is being steadily pushed along, a large gang of men being employed in this work, and also in clearing ground at the latter point for a townsite to be known as Crofton, where it is the intention to erect a smelter for the treatment of the *Lenora* and other ores.

Tyee.

During the current year the following properties have been acquired by the Tyee Copper Company, Limited, viz., the *X. L.*, *Tony*, *Donald*, *X. T. Fractional*, *Phil Fractional*, and *Muriel Fractional* mineral claims. All these properties lie in a westerly direction from the *Tyee Group*, and as the *X. L.* is contiguous to the *Herbert* (one of the *Tyee Group*) the company now owns a continuous chain of claims as far as the Chemainus river. Before the Tyee Copper Company acquired this new group of claims very little work had been done on them, with the exception of the *Tony*, on which two shafts had been sunk, one to a depth of 15 feet and the other 30 feet, good ore being found in each shaft. It is the intention of the company to run a tunnel from a point near the western boundary of the *Tony*, and this will pass close to these shafts and be continued along the ledge in an easterly direction.

On the *Tyee* the drift east along the ledge was continued to a point 350 feet east of No. 2 shaft, and cross-cuts put in north and south at intervals of 100 feet. Upraises from the north cross-cuts encountered ore in all cases after being carried up a few feet. Two of these north cross-cuts were driven a sufficient distance to intersect what is called the south vein. A drift was also run westward to the boundary of the *Tyee.*

The main shaft, which was started at the latter part of 1900, has been sunk to a depth of 330 feet. At No. 1 station (135 feet below the surface) a cross-cut south was put in which at 30 feet from the shaft encountered a body of solid ore. This cross-cut was carried through to the foot-wall of the ore body, a distance of 24 feet. The ore has been taken out of this level from wall to wall for a distance of 30 feet to the eastward, at which point the ore body widened to 35 feet, and for 25 feet to the westward where it still maintained the same width as where first cross-cut. The ore body has only been stoped for a short distance on the floor immediately above this level.

The yield of ore from this work has been about 1,500 tons, of which 200 tons, having an average value of copper 8 %, gold $5 and silver 5 ounces per ton, has been shipped to a smelter. A drift is bring run along a foot-wall to the east and is now about 100 feet in length and the ore body still shows every sign of maintaining its size and richness.

At a point 205 feet below the surface, the shaft encountered ore having a thickness of about 10 feet, for a distance of 21 feet. At this level connections were made with the workings of No. 2 shaft. So far the development work done by the Tyee Copper Company has proved the existence of a large and valuable ore body for a distance of 500 feet from the west boundary line of the *Tyee*, and to a depth of nearly 200 feet.

A cross-cut north from the shaft at No. 3 station should intersect the ore body passed through by the main shaft. When this cross-cut has been made it is the intention of the company to continue sinking the shaft, to prosecute development eastward at No. 1 station, and to make arrangements for continuous stoping from No. 2 station.

It is also the intention of this company to erect a smelting plant at Ladysmith, and an aerial tramway from the mine to a point on the Esquimalt and Nanaimo Railway.

The Mounts Sicker and Brenton Mines, Limited, a company which owns the *Victoria* and *Yankee* claims on Mount Sicker, and the *Copper Canyon*, *Venture*, *Susan*, *May*, *Star* and *Anoka* claims on Mount Brenton, has done about 350 feet of development work during the year, besides erecting the necessary buildings for the accommodation of its men.

It would take up too much space to mention all the claims in this camp upon which assessment work has been done during the past year, although I believe many of them promise well.

The waggon road from the Lenora townsite to the Chemainus river, and the bridge across the river, both built by the Government, have been a great advantage to the claim-holders on Mount Brenton, and are duly appreciated.

The Lenora townsite is being built up and a good hotel has been erected. The Tyee townsite also contains a number of houses. All those interested in this camp look forward to a busy and prosperous year.

RICHARDS MOUNTAIN.

The Vancouver-Mount Sicker Syndicate has continued its shaft on the *Lord Roberts* claim to a depth of 100 feet, and has cross-cut for 40 feet.

An American syndicate has acquired the following claims, viz.:—*Yreka*, *Oro Fino* and *Klamath*. A shaft has been started on the outcrop of the *Yreka*, and is down about 30 feet. Samples from the surface give the following assay results:—No. 1, 17.75 % copper and $2 gold and silver; No. 2, 12 % copper and $4 gold and silver.

A good road has been built connecting these claims with the Osborne bay and Maple bay roads, and the lumber is on the ground to put up the necessary mine buildings.

COWICHAN LAKE DISTRICT.

This section during the latter part of the year has received considerable attention owing, no doubt, to the discovery of ore on the four claims now held by the Duncan Mining and Development Company, Limited, viz.:—*Livingston*, *Protection*, *Silver King* and *Dot*. Work on these claims comprises one open cut 50 feet long; two open cuts 30 feet long; 100 feet of tunnel well timbered, and a cross-cut of 25 feet, all in ore. The tunnel at 100 feet gains 70 feet in depth, and another tunnel has been started 100 feet below No 1, which has been driven

30 feet, and assays from surface samples give 50 to 68 % lead; $2.50 to $5 gold; 4 % copper, and 5 to 10 oz. silver. No assays have been made of ore from the workings. Buildings, comprising bunk, cook and powder houses and blacksmith shop, have been erected.

American capitalists began in the autumn in a most businesslike manner the development of a group of claims situate on the west fork of the Chemainus river. Having obtained a bond on the *Richard N*, *Thistle* and *Two Friends*, they immediately built a pack-trail from the Half-way House (Cowichan Lake road) to the claims, a distance of 11 miles. Six men have been continuously kept at work, and a tunnel has been started to cross-cut the ledge at 100 feet. Owing to the nature of the ground the tunnel will only be about 140 feet in length, but every foot in length gives a foot in depth. On completion of this tunnel it is intended to start another which will be 600 feet in length, and this is expected to cross-cut the ledge at a depth of 450 feet.

The owners of this property are so well satisfied that they intend next spring to build a good waggon road, following the present trail as far as practicable.

LEECH RIVER.

During 1901 the Leech River Gold Fields Mining Company, Limited, was formed and acquired three leases of placer ground at the junction of Leech and Sooke rivers and Wolf creek. The method adopted to work this property was by fluming the Leech and Sooke rivers over the ground to a point below Wolf creek. This was successfully carried out and a pool, formed by the junction of the two rivers, was pumped out and prospected, but to reach bed-rock it was found to be necessary to obtain larger pumping machinery, and being late in the season the work was closed down for the year.

SAN JUAN, RENFREW DISTRICT

Assessment work in this locality has been steadily carried on, and Mr. H. E. Newton, who is largely interested, has spent a considerable amount of money in development.

Some few miles up the Gordon river from San Juan a large deposit of iron ore has been discovered, and is favourably reported on.

SOOKE DISTRICT.

Two claims in this District, viz., *Harry* and *Iron Hill*, have recorded work to the value of $600 and $500 respectively.

SAANICH DISTRICT.

The *Penton* mineral claim, owned by Mr. Thomas Graham, has been continuously worked since 1896 and shows up well. Several claims in its vicinity have lately been recorded.

Indications of coal have been found on Dr. I. W. Powell's farm in this District.

BLACK SAND.

Deposits of black sand carrying fine gold, found on the west coast of Vancouver Island in this Division, and mentioned in my report of last year, have failed to make any return, but I am not in a position to know if the same were thoroughly prospected.

The office statistics which follow show a large increase in the general mining receipts. This is a most encouraging sign, and miners generally report that assessment work is more honestly performed, and that the re-staking of claims by friends of the original owners occurs less frequently.

OFFICE STATISTICS, VICTORIA MINING DIVISION.

	1900.	1901.
Free Miners' certificates issued	774	874
Special " "	...	12
Mining claims recorded	158	345
Placer " "	...	5
Certificates of work issued	209	277
" of improvements issued	29	15
Grants of water for mining	13	5
Conveyances recorded	50	145
Abandonments recorded	1	4
Placer leases issued	...	2
Permits to re-locate claims	...	3

Revenue derived.

Free Miners' certificates	$6,542 86	$6,488 65
Mining receipts, general	1,741 30	2,892 35
	$8,284 16	$9,381 00

NEW WESTMINSTER MINING DIVISION.

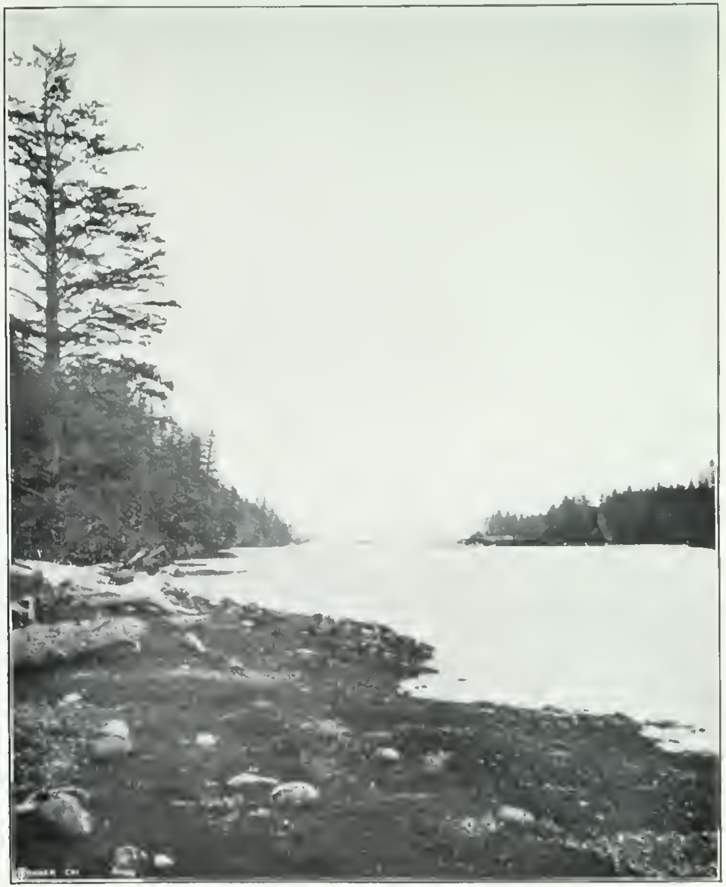
REPORT OF D. ROBSON, MINING RECORDER.

I have the honour to forward for your information the following report of mining operations in the New Westminster Mining Division for the year 1901.

It must be admitted that the year's operations have been disappointing, for although the number of new claims recorded is considerable, none of the properties believed to be specially valuable have been developed in accordance with the expectations of mining men.

The *Britannia Group*, on Howe sound, from which a great deal was expected during the year, still remains undeveloped. The transfer of this property to the heirs of the late Mr. Valentine, of London, did not materialise. The property has been examined by several persons during the year, but none of them have taken it up. A large transfer of stock took place, however, near the end of the year, and it is understood that the result of this transfer is the securing of a much stronger financial combination with resources sufficient to develop and work the mine. A good deal of work has been done during the year in surveying and prospecting the property, and about $20,000 has been expended. It is the intention of the management to erect a concentrator on the property next season, and, later on, a smelter. There seems to be no question as to the vast quantity of ore on this property, and, if developed and worked, it will give employment to a large number of men for many years.

The *Goldsmith Group*, adjoining the *Britannia*, consists of a number of claims in character much similar to the latter. The ore body on this group has not yet been proved to be as extensive as that of the *Britannia*, and not nearly so much development work has been done. The property is owned by the Goldsmith Copper Syndicate, of Vancouver, and during the year between $5,000 and $6,000 has been expended on the property. The intention of the company is to resume development during the coming season, but no definite plan has yet been adopted.



MOUTH OF NIMKISH RIVER, V. I.

ESTERO BASIN (Frederick Arm, Nanaimo M. D.)

On the *Humphries Group* of 12 claims in South valley, not far from the *Britannia*, about $5,000 has been expended during the year. This is also a copper proposition, with ore similar to that of the *Britannia* and *Goldsmith Groups*. Some good samples of molybdenite have been found on this property, but the extent of this mineral is quite limited.

Considerable work has been done on several other properties on Howe sound and vicinity, but none of these claims can really be said to have advanced beyond the prospect stage. The distribution of copper ore through this region has, however, proved to be very extensive, and it is believed that vast quantities of the low grade ores found here may be worked at a profit, by the application of modern devices and economic methods.

On the *Lynn Creek Group*, near Moodyville, work has been carried on during the year, but no new developments worthy of special mention have been reported, although several thousand dollars have been spent, and the results are said to have been satisfactory to the owners. Of this group, Mr. W. Thos. Newman says: "The formation is peculiar in that instead of small veins the ore occurs in chutes in an immense much-altered dyke, striking about 10° north of west, this dyke being at one and the same time the country rock of the claims and the matrix of the ores. So far six, possibly seven, chutes have been discovered in these claims, the ore in some being clean sulphide of copper and pyrrhotite 4 or 5 feet in width. These ores run in value from an iron oxide containing some copper, an iron sulphide with considerable copper, to a clean chalcopyrite. One chute is a solid clean body of pyrrhotite with copper of fine grain. The chutes are defined and proved to continue for hundreds of feet." It is expected that extensive tunnels will be driven, for the purpose of blocking out the ore, this year.

On Pitt lake little work has been done. The *Golden Ears Group* remains inoperative. On the *St. Paul Group*, on the opposite side of the lake, prospecting has been continued and a vein of molybdenite 4 feet wide has been uncovered for a distance of 400 feet. Although no proper assay has been made it is believed that the ore will yield a high percentage of molybdenum, and it contains as well, copper, silver and gold to the value of from $1 to $5 per ton. The presence of molybdenum in these claims was not known until recently, and the value of the find is doubtful in view of the limited demand for this metal.

On Harrison lake and on Fire mountain there have been no new developments, and very little work has been done.

Very little progress has been made in the Mount Baker district. The Golden Chariot and Golden Star Mining Companies have spent about $10,000 in connection with their property, but the expenses of transportation have been so great that the work has been only of a preparatory nature. The manager of these claims reports that the principal values appear to be in copper, and further development is contingent on better transportation facilities and better prices for this metal. A waggon road has just been completed, at a cost of $12,000, from Huck's ranch, Chilliwhack, to Selicia creek, for a distance of nearly 9 miles in the direction of the mines. The distance from the termination of this road to the International Boundary is about 12 miles. When this road has been extended through the mining region it is believed that development work will be greatly stimulated. It is estimated that about $15,000 has been expended in the Chilliwhack district in connection with mining operations during the year.

Quite recently reports of rich gold discoveries have come from Upper Sumas, and several miners have gone into the new camp. The value of these reported discoveries remains to be proved.

OFFICE STATISTICS—NEW WESTMINISTER MINING DIVISION.

	1900.		1901.
Free miners' certificates issued	1,439	....	1,208
Quartz claims recorded	483	....	376
Placer claims "	14	....	8
Certificates of work issued	278	....	338
Certificates of improvements recorded	27	....	7
Conveyances recorded	81	....	119

Revenue Derived,

	1900.	1901.
Free miners' certificates	$10,488 00	$8,089 98
Mining receipts, general	2,436 00	4,033 80
	$12,924 00	$12,123 78

It will be seen that while the revenue for the division has fallen off by $800 the decrease is wholly in the sale of free miners' certificates, the general mining receipts having increased by $1,598. The total expenditure on account of mining in the division during the year has been, approximately, $75,000. The number of mineral claims on the record book at the end of the year is 4,723.

Coast Smelters.

In addition to the Van Anda smelter on Texada island, in the Nanaimo Mining Division, which has been in operation for some years and has been fully described in previous reports, two new smelters are in course of erection on Vancouver island, both in the Victoria Mining Division, viz.: The Tyee Copper Company's smelter at Ladysmith and the Northwestern Smelting & Refining Company's smelter at Crofton.

Crofton Smelter.

The Northwestern Smelting & Refining Co.'s smelter is being constructed at Osborne bay, on the east coast of Vancouver island, and here the townsite of Crofton has been laid out. The smelter will treat the ore from the *Lenora* and from other properties, and a line of narrow gauge railway is being built from the mine referred to to Osborne bay.

The ore bins have a capacity of 1600 tons, and a trestle railway has been laid over the top of these, for convenience in unloading the ore cars. From the bins the ore goes to the crusher and sampling building and is thence discharged into the furnace ore bins, from which it is taken to the furnace on hand cars. The plant consists briefly of: three 200 h.p. boilers; one 500 h. p. Corliss engine; one 450-ton water-jacketed furnace; one 65-ton water-jacketed furnace; one Bessemer converter. The main flue will be 200 feet long and 12 feet wide, communicating with a large expansion chamber where the dust settles, and from which the gases will enter the brick smoke-stack, 12 feet in diameter and 125 feet high.

The initial capacity of the smelter will be 400 or 500 tons per day, but the plant is being built with a view to allow of the treatment of 1,250 tons per day. A wharf has been built extending 750 feet into the bay.

Tyee Smelter.

The Tyee Copper Company's smelter is in course of construction at Ladysmith, on Oyster harbour, and is designed to treat the ore from the Tyee mine and other properties.

The work is being carried on under the superintendence of Mr. Thos. Kiddie, and the smelter is expected to be in operation by September 1st, 1902. The plant will consist, briefly, of a 150-ton water-jacketed furnace, a complete sampling plant, the bins having a storage capacity of 1,600 tons, an 80 horse-power Corliss engine and a 80 horse-power tubular boiler. The smelting shed is 80 by 60 feet, and the engine room 50 by 70 feet, with ample space for further extension.

The ore from the sampler goes direct to the roast piles and, after burning, to the bins at the rear of the smelter. The slag will be shotted with water and flumed into the lagoon. Grading has been done for considerable extension. The converter plant will not be installed at present, but foundations will be put in so that this may be done at any time.

REPORT OF THE PROVINCIAL MINERALOGIST

ON THE

VERNON, KETTLE RIVER, OSOYOOS AND SIMILKAMEEN MINING DIVISIONS.

VERNON MINING DIVISION.

The Vernon Mining Division is chiefly devoted to agriculture, and as yet mining and prospecting have received comparatively little attention.

Okanagan Valley.

The whole southern part of British Columbia has certainly been favoured by nature in the matter of climate and the Okanagan valley in particular seems to have received even more than an equal share of this blessing. The interior of the Province has often been described as a series of valleys, each of which has its climatic peculiarities and which run north-west and south-east, parallel to the main range of the Rockies. Of these the Okanagan lies lowest as regards elevation above the sea—about 1,250 feet—and has a dry atmosphere with a great deal of sunshine. The soil is light but exceedingly fertile wherever assisted by irrigation, for which purpose there are abundant streams fed from the snows of the higher mountains and plateaus. The valley lands and low hillsides are sparsely timbered, requiring little or no clearing, and in the southern part cactus and sage brush grow in profusion, indicating the dryness and warmth of the summers. With irrigation—which is everywhere possible—almost anything can be grown, from tobacco to fruit and grain; summer frosts are said to be unknown, and in fact this valley seems destined to become the garden of British Columbia.

There are a number of growing and prosperous towns in the district, the most important being Vernon, situated on a branch railway running from the Canadian Pacific at Sicamous to the head of Okanagan lake and connecting there with a line of steamers running to Penticton at the southern end of this lake, from which point stages go to Fairview, Camp McKinney and Keremeos.

It is expected that within a short time this southern part of the district will be opened up by a railroad connecting with the lines of the Boundary district.

The town of Vernon lies 2 or 3 miles north-east of Okanagan lake, in a broad valley at the junction of the White with the main valley, and is surrounded by low, rolling, bunch-grass hills and magnificent ranch land, some of the best in the Province. Here is situated the office of the Gold Commissioner and Mining Recorder of the division. The town is the distributing centre of quite a large district, and has a number of first-class stores, hotels, churches, etc.

In the neighbourhood of the town of Vernon a large number of mineral locations have been staked, but few of these have received sufficient development work to show definitely what they may amount to in the future. The greater number of these claims are situated near the head of Okanagan lake, and on the opposite shore from Okanagan landing. The following are among those having the greatest amount of development. They were inspected on June 30th, 1901:—

Sunflower Fraction.

The *Sunflower Fraction* mineral claim was located on April 2nd, 1894, and is owned by J. W. Hugh *et al.* The country rock consists chiefly of altered schists, in which occurs an interbedded quartz vein about 2 feet wide, dipping to the north at about 80° and having an east and west strike. The development consists of a shaft about 10 feet deep, at the time partly filled with water, which prevented a close examination, but from what could be seen the vein, where exposed, was somewhat irregular. The mineralisation consisted of iron sulphides sparsely scattered through the quartz, and said to carry gold values.

British Empire.

The *British Empire* mineral claim is situated in the same camp, at an elevation of about 1,400 feet. There is here a quartz vein about 2 feet wide, having a strike north 45° west, cutting through schist and slate and apparently associated with an igneous dyke.

The development consists of a shaft from 40 to 45 feet deep, from the bottom of which a drift has been run some 5 feet. The shaft, which, at the time of inspection was half full of water, was timbered and encased in plank and provided with a good ladder, etc., but it could not be closely examined. The quartz was mineralised with iron sulphides, carrying gold values and a certain amount of free gold. While the mineralisation is sparse, such as there is must be quite rich since an assay on a sample showing no visible free gold and containing but a small percentage of mineral in the quartz gave $44 in gold and an ounce in silver per ton.

Rex.

This claim is owned by Siddle, Young *et al.*, and is situated about 150 feet above the lake. There are two parallel quartz veins of 12 inches and 18 inches thickness in a crushed zone which follows down an igneous, hornblendic dyke, having a strike east and west and dipping to the north, on which a shaft, 73 feet deep, has been sunk, with a drift from the bottom of about 20 feet. The shaft is timbered with planking and has a good ladderway, etc. The ore consists of iron sulphides scattered through the quartz and carrying gold values. The average value is stated as $10 per ton, though higher returns than this are often obtained, particularly near the surface.

Old Sarah.

Note.—Some doubt exists as to the identity of this claim, as no one was working on the property and the name could not be seen on the posts; it is, in fact, only identified by a prospector who happened to pass by. The property is situated at an elevation of 1,500 feet, in the same camp as those already referred to. The tunnel which had been driven had partly caved in. From surface indications there appeared to be a fairly regular quartz vein of about 10 inches average width, following along a crushed zone parallel to a fine-grained, light coloured dyke. Towards the end of the drift the vein seems to have been cut by a fault, and the work done does not show how important this fault may be. The mineralisation is, as in other claims in the camp, iron sulphides carrying certain gold values.

Bon Diable.

Some 3 miles to the N. E. of Vernon, on the B. X. mountain, there has been considerable work done on its claims by the Bon Diable Mining Company. The property of this company lies on and near the top of a grassy knoll, at an elevation of 2,250 feet.

The country rock is probably a highly altered and disturbed sedimentary, and is cut by a number of large white quartz veins having a general strike of almost N. 20° E., and a dip to the N. W. of 75°, though in places much flatter. These veins are seemingly associated with certain igneous dykes, but exactly in what way is not very clear from the development done. The principal workings consist of a shaft some 36 feet deep, from the bottom of which a drift of 80 feet to N. 75° E. is said to have been made, but this could not be examined, as the shaft was half full of water. The shaft seems to have followed down a quartz vein of about 30 inches in width at the surface and probably less at the bottom, where it is reported by the men who worked on the property to have been faulted, an attempt to pick it up again having been made in driving the drift, with what success is not known.

There are a number of other small excavations on outcroppings of quartz, but apparently these have been conducted without any system and they indicate but little. Some copper stain is apparent, but the values are chiefly in gold, and are reported to be low, which is confirmed by the assays of samples taken. The development is very unsatisfying; the property has possibilities, but what has been done has not proved any ore of a workable character. A good cabin has been built, but it is situated on land held as ranch property.

About 15 miles to the north-west of Vernon there are certain other properties situated on B. X. mountain, at a considerable elevation, which have had a good deal of development done upon them, and are said to have some promise. On the last day of June these claims were reported by the Gold Commissioner as being covered with snow, and, consequently, it was not possible to examine them.

On *July 1st* the Provincial Mineralogist and party started with pack-train up the White valley waggon road, which is splendidly kept and well graded and follows up the valley of that name. This valley at its lower end is several miles wide between the hills, with a fine extent of bottom land, chiefly under cultivation, and forming as good farms as can be seen anywhere.

A few miles beyond Vernon the road passes through the famous Coldstream Ranch, belonging to Lord Aberdeen, late Governor-General of Canada. This is now worked as a model farm, and is developed and run as only can be done with large capital. The orchards cover nearly a hundred acres, and are most beautifully laid out and kept, and the hop fields, also covering many acres, are permanently strung with wires and wire cables. The hop picking season brings in a regular immigration of Indians each year. The buildings, &c., are complete in all requirements, and the whole forms by far the best equipped farm in British Columbia.

Camp was made some 16½ miles from Vernon, on the bank of Harris creek, near Lumby P. O., a collection of some 8 or 10 buildings at an elevation of 1,750 feet. The whole valley up to this point is wide, with good ranch land all the way, the hills being covered with timber. Harris creek rises to the south, in the plateau of the same name, an immense area of comparatively level country at a considerable elevation, abounding in big game, and to which large hunting parties go from Vernon every fall.

July 2nd.—After some adjusting of pack saddles, the party continued up the White valley by the road. About 18 miles out from Vernon the valley narrows gradually, leaving less and less bottom land suitable for cultivation, the increasing elevation also having its influence and rendering the district best suited for grain, hay and grazing, there being fair feed on the hills. About 21 miles from Vernon the valley finally narrows into a pass, rocky and of no value for agricultural purposes, the road rising rapidly until, at 23 miles out, the summit between the White valley and the Shuswap River valley is reached at an elevation of 2,400 feet. From this summit the road descends rapidly for 3 miles by a very winding course along the hillsides, reaching the Shuswap river, just above the canyon, at an elevation of 1,720 feet. The waters here flow north-west, emptying into Mabel lake and eventually into Shuswap lake. Camp was made where the road reaches the river bottom, an excellent place with good horse feed and water. Below this point the river runs very swiftly through a canyon with steep banks, the hill rising abruptly from the water's edge. The hills are well timbered with small spruce and pine, but as far as could be seen no available agricultural land existed for some miles down the river.

July 3rd.—Camp was broken at 6.30 and the road taken again, following up the river (the Shuswap) the valley of which widens as it approaches the level of the plateau, while the hills become less pronounced, leaving a strip along the water suitable for ranching which, in this section, owing to the distance from markets and the difficulty of access, must be confined to raising cattle and like products, though the climate is such as to admit of all vegetables, etc., being grown for home consumption. A number of farms have been taken up here, but they did not bear the appearance of much success, and were mostly deserted, for the time being at least.

The road follows the left bank of the river up for some distance, crossing 8-Mile creek at about 32½ miles out from Vernon, and gradually gaining an elevation of 2,550 feet, when the Cherry creek plateau is reached. The timber here is small, the soil clayey and the grass scarce, a rather desolate looking country. Camp was made on this plateau, at a distance of 39 miles out from Vernon, in a pelting rain storm; it was, however, the only available place for horse feed, and advantage was taken of an old, deserted cabin in which cooking could be done out of the wet. This cabin was a relic of the old days of a placer excitement in this section.

July 4th.—About a mile further on there is an occupied farm house, which also serves as a store and post office for a few ranchers and prospectors of the district, and from this point mail goes to and from Vernon once a week.

Some 41 miles out from Vernon the road crosses, by a bridge, over Falls creek, here some 20 feet wide, at a point about half a mile above the junction of this stream with Cherry creek, an important tributary of the Spallumcheen.

Cherry Creek.

On Cherry creek, near Falls creek, some 41 miles out from Vernon and close to the waggon road, there was evidence of considerable placer mining having been carried on in earlier days. There is a good ditch taking the water out of the latter stream, and it is reported that a good deal of placer gold was obtained from here in 1879. At the time the creek was visited (July 3, 1901) some little work was being carried on, but the water was too high to allow of more than the preliminary operations being carried on.

The *Upper Diggings*, Cherry creek, are reached by a short trail from the main waggon road at about the 41-Mile post. The creek is here about 150 or 200 feet across, the bottom being composed of small gravel not showing much wear, although it is reported that there are a number of boulders on the bed-rock. Wm. Mitchell and another man have run a bed-rock flume, and they take out a little gold each year, but not amounting to much more than a living.

At the *Lower Diggings*, some half-mile further down the creek, Jack Merritt was working alone, and was running a tunnel, which was in at the time from 50 to 60 feet on bed-rock, into the left bank. He was obtaining only small returns for his labour. It is stated in the Report for 1892 that this tunnel was then in 1,500 feet and had not found bed-rock, which gives some idea of the amount of work done. Some two miles further down the creek a party of Chinamen are working in the bed of the stream, but they are paying expenses only.

In the same neighbourhood a certain amount of prospecting for lode mines has been done, and there are some satisfactory surface showings producing fair samples.

Excelsior.

The *Excelsior* mineral claim has been located by Harry Melville on the right bank of, and some 500 feet above, Cherry creek, nearly opposite the upper diggings referred to. The owner has sunk for some 8 to 10 feet on a quartz vein, about 8 inches wide on the surface and carrying galena, said to have assayed on clear samples 120 oz. of silver to the ton. The development had not, so far, shown up any appreciable body of ore.

From the Cherry creek diggings the road follows up the general course of the stream to the mouth of Pass creek, keeping well up on the bank. It then follows up the narrow valley of the latter between high mountains (6,000 feet elevation) until the summit of the Monashee pass is reached, at a distance from Vernon of some 48 miles.

Right in this pass, at its summit, was found the cluster of log buildings forming the old camp, locally known as "Monashee," and consisting of three or four good bunk houses, a mess house, office, barns and stables, blacksmith shop, etc. These are well constructed and evidence a once substantial camp, now deserted though still in good repair. These old buildings, with their tight roofs and great, open, stone fire-places, formed a very acceptable refuge from the rain and chill of the summit, and camp was accordingly made here for the night of July 4th.

Monashee Group.

The Monashee mines, as this group is usually called, was among the first of the mines worked in this Province, the claims having been Crown-granted by D. McIntyre and L. W. Riske in 1886. In the reports of this department for 1890, it was stated that the owners had completed a "stamp" mill to crush the ore and had built $2\frac{1}{2}$ miles of ditch to bring in water for power, and in 1891 it was reported that "good results" were obtained, but that the mill had shut down for want of water. The mine is not now being worked and the plant is abandoned, but the mill and the extensive offices, houses, etc., are still in good condition. A large amount of money has been spent on the property, variously estimated at about $100,000.

The property lies in Monashee pass at the very summit, between the headwaters of Cherry creek and of the main Kettle river, and at an elevation of 4,000 feet at the lower to 4,500 feet at the upper workings. The claims, some four or five in all, extend from the valley of Pass creek eastward up the steep side of and to the summit of Monashee mountain. The upper workings (elevation 4,500 feet) are reached by a good road from the valley, and consist of a tunnel about 300 feet long, driven into the hillside almost due east. This, while showing some mineralisation, did not exhibit enough to be of value.

At an elevation of 4,230 feet another tunnel has been driven for 30 or 40 feet, and a third tunnel, near the bottom of the hill, was run in for some 155 feet N. 80° E. through gravel wash and slide, in which it is understood some free gold was obtained; solid formations were then struck and the tunnel was continued due east for 115 feet. At the contact of the gravel and the solid a drift was set off to the right about S. 15° E. for 85 feet, following such contact. At the end of the drift a cross-cut was made into the solid, following and developing a vein of white quartz, which is here 10 feet wide, but diminishes to about a foot. This seems to have been the chief point of ore production.

The vein upon which the tunnels were run is white quartz of rather an irregular cross-section and not easily traced. The values are in gold associated with iron sulphides. No sampling of the mine was possible, nor was any attempted, but in the bins at the mill there was a considerable amount of ore, and this pile was sampled carefully and gave upon assay $6.80 in gold and 1 ounce in silver per ton.

The mill consists of a Blake crusher, Chilian mill, amalgamating plates and concentrating machinery, contained in a log building and driven by a Pelton water-wheel fed from a ditch, already referred to, which brings water over the divide from the Kettle river slope.

FALLS ON BOULDER CREEK.

MOUTH CANYON CREEK, KETTLE RIVER.

KETTLE RIVER MINING DIVISION.

The waggon road from Vernon runs as far as Monashee, a distance of some 48 miles, but here it ends, and from this point the trails branch off.

This summit of Monashee pass also marks the easterly limit of the Vernon Mining Division, the slope to the eastward—the Kettle river slope—being in the Kettle River Mining Division.

What is known as the "Kettle river trail" runs through the pass to the south of Twin lakes, and follows the stream flowing out of these down to its junction with the Kettle river at the bar, a distance of 8 miles, and is said to be an easy and fairly good trail, though very little used; thence it continues down the river. Some years ago this trail, and the trail from the bar to Old's meadows, formed part of that built by the Government for the purpose of taking cattle from Vernon through the Fire valley to Arrow lake. There is an old trail continuing from the road to the upper Monashee workings: this zig-zags up the mountain side and over the summit of the Porcupine range, and, passing by several prospects, follows down a ravine to the valley of Kettle river at Paddy's crossing. The country rock, as exposed on the higher ranges of the mountains, seems to be chiefly granite, but with occasional bunches of altered sedimentaries.

A second trail, known as the "new Government trail," also leads to Paddy's crossing, branching off the Kettle river trail to the left about one mile from Monashee and opposite Twin lakes, fording the creek a mile further on and climbing over a shoulder of the Porcupine range by a series of zig-zags, then continuing over the plateau at an elevation of about 4,500 feet until a gradual descent is made to the Kettle river at Paddy's cabin, the total distance from Monashee being about seven miles by trail.

The country traversed is chiefly granite, slightly covered with boulder wash and practically devoid of timber of any size, it having been all burnt off at some early date. The trail is not much used and is quite steep in places, but on the whole is a very fair one and is in good order, much better indeed than the old trail over the mountain.

From Paddy's cabin a trail runs up the Kettle river to a number of claims, but as their location was not known and they were not being worked, the writer did not visit them.

The two trails referred to join at Paddy's cabin, where the Kettle river is crossed by a safe and easy ford, and continue to Wauchope, at the head of Fire valley, continuing round the south end of Old's mountain into the valley of Slow creek, following this creek up for some three miles and crossing the low summit to the head of the Fire valley.

The trip from Monashee to Wauchope is a good day's journey for a loaded pack-train. At Wauchope there are two or three houses and a store, all deserted, while half a mile above, in the valley, there is a ranch house and barn, although little attempt has been made at cultivation.

This upper end of Fire valley is about three-quarters of a mile wide with some little meadow land, and as the country has been swept by fire there is little timber other than second growth. There is fair feed for pack horses and good water in the valley above Wauchope, but not below for some distance. It is reported to be about 25 miles by a fair trail down the Fire valley to Killarney, on Arrow lake, from which point the supplies for the camp and for Wauchope are brought in.

OLDS MOUNTAIN.

Olds mountain is the divide between the headwaters of Kettle river and of 8-Mile creek, a tributary of Inonoakin creek, which latter flows down the Fire valley. Fire valley is so called from the fact, already mentioned, that a fire swept up the valley and killed all the trees on both hillsides. On the slope draining into Slow creek, a tributary of the Kettle river there are a number of claims staked out, few of which have had any development work done on them, although some show, by shallow open cuts, that they have at least been prospected.

The country rock forming the greater part of the mountain is granite, with areas of highly altered argillaceous rocks, while the mineralization appears to have been found in quartz veins of rather variable regularity. It has been reported that from several of these claims ore has been obtained containing tellurides carrying high gold values, and samples, said to have been brought from here, have been sent to the Department of Mines. Upon analysis these did show the presence of tellurium associated with gold, yet a careful search on the properties visited failed to disclose any such ore in place or on the dump.

On *July 5th* no person could be discovered in or about this "camp," and it was with great difficulty that any of the claims were found. It is possible, therefore, that many may have been overlooked, or that all the workings were not noticed on those claims which were found. However, the best that could be done was done.

Olds Group.

Olds Group is an exception to the rule that little or nothing has been done on the claims in this camp, since a very considerable amount of work has been performed on this property.

The group is situated on the Slow creek slope, at an elevation of about 5,800 feet above sea level, on a very steep hillside, and consists of several claims. It is reached by a rather blind trail, starting near the small lake at the head of Slow creek. There are on the property three shafts and as many open cuts made on and exposing a quartz vein, which in places is 8 to 10 feet wide, but may be averaged at 4 to 5 feet.

The general strike of the vein is about N. 70° E., and the dip obtained in one of the shafts was 65° to N. into the hill. The most easterly opening found was a long, open cross-cut in wash, evidently run to locate the lead, which seems to have been faulted a few feet further west. This shows up a quartz outcrop, but no further work has been done. Some 20 feet further west and across the supposed fault is an open cut on the lead, while 40 feet further west there is a shaft which was full of water and could not be examined, but from the material on the dump was estimated to be 40 feet deep. Still to the westward some 100 feet there was another shaft, also full of water, with a windlass, while 90 feet to the west of this again there is an open cut showing a large quartz outcrop some 8 to 10 feet wide; and yet further to the west there is another inclined shaft about 15 to 20 feet deep.

The dump of the largest shaft showed the quartz to be sparsely mineralised with iron sulphides, but no trace of tellurides could be found. A general sample of the dump was taken, and upon assay gave $6 in gold and 1½ oz. in silver. The property is owned by the Olds Brothers, and they have put up very good cabins, etc.

On the west slope of Olds mountain—that is, on the Barnes creek drainage area—there are a large number of claims located, but none of them were being worked, and as no one could be found who knew anything as to their location, their identity could not be established, as the posts are quite illegible. The work done has been simply prospecting.

Eureka.

From Wauchope a trail follows up 8-Mile creek to the divide and thence follows down Barnes creek for some two miles, at which point the Eureka mine workings were found, at an elevation of about 5,000 feet. These consist of two levels driven into the hillside. The lower tunnel is started about 20 feet above the creek bottom, and has been driven in about 100 feet in a northerly direction. Some 40 feet vertically above this is the second tunnel—in 12 feet, N. 20° W. The tunnels appear to have followed in an acid dyke, which is mineralised with iron sulphides and is said to carry gold values. A rough average sample gave $1.20 in gold per ton, and a trace of silver, with no tellurides. There was a cabin on the property, which had been recently occupied.

Telluride. Near the divide, workings were found on the hill consisting of an open cut about 40 feet long on a quartz lead. Here were posts marked "Telluride Claim," but no telluride was visible in the ore, and the mineralisation consisted of slight quantities of iron sulphides. No general sample was taken.

On *July 7th* the party moved camp from Olds Meadow, near Wauchope, and followed Slow creek down to the Kettle river bar, a distance of 6 miles, the trail crossing and re-crossing the creek in the last 2 miles and winding through a flat valley, a mile or so wide, in which there are about 2,000 acres of good ranch land. This plateau is about 200 feet higher than the Kettle river valley, and Slow creek, in the last half mile of its course, makes this descent through a rocky canyon, giving opportunity for establishment of a very good water power.

Just before reaching the Kettle river bar the trail keeps off to the right and cutting down a steep gravel bank crosses both the Kettle river and the creek from Twin lakes, immediately above the point of junction of these two streams. These fords have gravelly bottoms, hard and smooth, but at any time near high water would be troublesome to make, as the current is swift and the landings are poor.

The trail continues up the steep right bank of the Kettle river—a rise of some 200 feet—to a plateau covered by small, second growth jack pine with fallen timber, and here joins the trail already mentioned as running from Monashee.

From this point the trail is "blind," but a course was picked out, leading away from the river and cutting across a bend to the mouth of Fish creek, a distance of 6 miles.

The benches of the Kettle river are here composed of gravel wash with a light surface deposit of soil and are unfit for agriculture. They have been prospected for placer gold but although colours have been found, may be said to be valueless.

Camp was made shortly after noon on Fish creek, some half mile above its outlet into the main river.

Certain coal areas were reported as having been staked here, but a diligent search of the locality revealed no prospecting work of any kind, although posts were found locating some four square miles as coal lands, on June 2nd, 1900, by Wm. Kyte and others. As far as could be seen, however, there were no surface indications of coal or of rocks which might be expected to be coal-bearing. The creek was explored by following up an Indian trail for some 8 miles, as far as Fish lake, the source of the creek.

The ground surface is covered with gravel wash, in more or less clearly defined terraces, with little rock in place visible. In the creek bottom the gravel appeared to be derived entirely from broken volcanic rocks of comparatively recent origin, seeming to indicate that such is the geological formation of the country towards the Harris plateau.

Fish lake is about two miles long and three-quarters of a mile wide and is deep, with rocky sides. The rocks and rock slides forming the shore, as far as could be seen from the lower end of the lake, were of igneous origin, dark coloured and of a fine-grained structure, inclining towards basalts. The lake, as the name implies, is a famous fishing place for the Indians of the Okanagan valley.

On *July 8th*, at 6:30 a. m., camp was broken and the Provincial Mineralogist's pack train set out for Brewer creek, a distance of 10 miles. The trail here is "blind" and the country covered with fallen timber and second growth fir and pine, making most arduous travelling, and although not naturally a difficult country the 10 miles accomplished was found to require a full hard day's travel with a pack train. Brewer creek was reached about 5 p. m. in a heavy rainstorm, and a very wet camp was pitched in the creek bed about a mile from the main river. The feed for horses was good here, and as they needed a rest as well as the party generally, it was decided to "call" the next day Sunday and not move camp.

There was here evidence of considerable game, deer and bear tracks being plentiful and fresh, while the trout fishing was good in both the river and creek. At the junction of the river there were several small beaver dams and beaver were seen close enough to be touched with a fishing rod.

July 9th was spent exploring Brewer creek on foot for some 5 or 6 miles up. This stream flows into Kettle river from the west (general course about S. 60° E.), forming one of the main drainage channels to the east from the Harris plateau.

Where the valley of Brewer creek joins Kettle river valley the gravel benches are nearly 2 miles wide, and are cut deeply by the former creek, which has steep banks of gravel. These show evidence of having been, in earlier days, extensively prospected for placer gold, but the nature of the work done also shows that the results were not satisfactory.

The gravel upon panning yields a considerable quantity of fine black sand, but repeated attempts did not show even colours of gold. The gravel is well worn, but is composed entirely of the detritus of the more recent igneous rocks already mentioned, the absence of even occasional samples of sedimentary rocks being most marked. A very considerable proportion of the gravel was a light coloured granite, which had scattered all through it minute particles of magnetite, doubtless the source of the black sand noted in the creek.

The benches extend to a height of 300 or 400 feet above the river, gradually merging into the hills, which have an elevation of about 4,000 to 5,000 feet above the sea level. These benches are covered with a slight layer of soil, but are not suited for agricultural purposes, though they support a coarse grass crop which is sufficient for pack horses and other animals.

About one mile from the mouth of the creek, and in a line with the foot-hills, there is an outcropping of the solid rock formation exposed in the banks of the creek. The formation here seems to be chiefly granite, alternating with dykes of fine-grained basic volcanic rocks, and occasionally, apparently, with still more recent smaller, and very acid dykes. Through this formation, on the left bank of the creek and showing for 100 feet or so, there runs a quartz lead giving evidence of much movement. It appears to cross the creek bed, having a strike nearly E. and W. magnetic, but a thorough search of the formation on the opposite bank failed to reveal its continuance. The quartz is sparsely mineralised with iron pyrites and arsenical iron pyrites with certain gold values.

Posts were found marked as belonging to the *Uncle Sam*, *Delaware*, *Belmont* and *Helena* mineral claims, on none of which properties could work be found to amount to an assessment, and it is therefore assumed that they were abandoned. Some of this same ground had been restaked on May 27th, 1901, by F. Williamson, as the *I. X. L.* mineral claim, but no work had been done on the property.

On *July 10th*, at 6.30 a. m., the Brewer creek camp was broken, and a move made to Quartz creek, a distance of 8 to 10 miles. Such evidence as there was of a trail leading down the river from Brewer creek crossed the main river by a ford about half a mile below this stream, which is here swift; the bottom is hard, however, and the ford is easy at low water, although at high water it would be troublesome. If a trail is made down the Kettle river it should follow the west bank all the way, and not cross the stream, as such crossings can only be made at low water and are quite unnecessary.

After crossing the river a trail was picked out on the top of the benches and on the side of a range of granite hills of an elevation of about 4,000 to 4,500 feet, which flank the eastern bank of the river for some 4 or 5 miles. The river valley in places narrows down to about 200 yards, with steep sides of granite, the only rock seen here in place. On this stretch of the river there is no agricultural land or timber of value.

Camp was made early in the afternoon on Quartz creek, just above the falls and about 500 yards from the mouth of the stream. This creek is a very swift one with rocky sides and rough boulders on the bottom above the falls. Below the falls the stream runs through a rocky gorge with perpendicular sides 200 feet high.

The falls referred to have a perpendicular drop of over 100 feet, and within 100 yards would give a head of water of from 150 to 200 feet, capable of developing at low water from 5,000 to 6,000 horse power, at practically very slight cost of development. Below the falls on the main river there are two or three flats, comprising some 400 or 500 acres, which might be suitable for agricultural purposes, but the surrounding hills are barren; these flats, however, provide ample feed for pack animals. It was reported that certain mineral claims had been located on Quartz creek, but no evidence of work or even location posts could be found, nor was there any indication of mineralisation to be seen here.

The only feasible ford across this creek is about 100 yards above the falls, and here, even at low water, the current is so swift and the bottom so bad that, coupled with the fact that if a horse fell it would certainly be carried over the falls, it was considered best to "fall" a tree across the creek, over which the packs were carried, while the horses were "lined" across. A pack bridge is needed here, and one could be put in at the cost of 6 days' labour, as the necessary span is only 25 feet.

July 11th.—After fording Quartz creek the trail runs due south along a rocky side-hill keeping at an elevation of 300 to 400 feet above the river bottom for some two miles, when the valley widens, the mountains on the east side receding, and being replaced by gently sloping foot-hills covered with good timber, chiefly fir and spruce. The trail here descends into the valley bottom, still following the east side of the river till, at about 10 miles from Quartz creek, an abrupt rocky spur from the mountains cuts it off. Camp was, in consequence, made here for the night, in a bunch of second growth jack pine and spruce in the bottom, about a mile above Mohr creek.

July 12th.—This proved to be one of the hardest days in the whole trip. No feasible trail could be found down either side of the river, and a course had, therefore, to be taken along the bed of the stream, crossing and re-crossing from bar to bar for over a mile, a thing which could only be done at low water. An attempt was made to again pick out a trail on the east side of the river, but this, after some hours' work, had to be abandoned, and the stream was again forded, a blazed line being then found on the west side, which was followed, and which led along through the bottom for some distance and over rock slides coming down from the hills This trail finally led up a bank from the river so steep that, when it was attempted to take the pack horses up, their loads dragged two of them over backwards down the hill and into the water, some 100 feet below, fortunately doing no serious damage to them, and only wetting the blankets, while all instruments, notes and papers, being in a leather bag, escaped with little damage. Camp was finally made on a rock slide near the river, where a little grass for the horses was found. The effective distance travelled was not over 5 miles in 10 hours' hard work.

The hills on the east side of the river, as far as could be seen, were composed of fine-grained igneous rocks and granites, and on the west side chiefly of a fine-grained igneous rock inclined in places to be porphyritic in structure.

July 13th.—As there was practically no feed for the horses a very early start was made, and the trail taken down the west side of the river, reaching a creek called Nevertouched creek after a journey of about 17 miles through comparatively easy country. The trail follows the benches extending parallel to and about 200 feet above the river. These benches are chiefly wash from the surrounding hills, and are composed of fragments of granite and other igneous rocks somewhat water-worn, and with many large boulders. Vegetation is sparse, and timber is scarce, being largely second growth. Split creek, which flows in from the west, but is not a stream of any size, was crossed during the day at about half the distance between the two camping places.

July 14th, Sunday.—Camp was not moved on this day, as the horses badly needed rest after the rough trails of the previous days, the time being spent in examining Nevertouched creek, which is an important stream flowing in from the west. This creek was followed up for some miles. The banks are steep, and so densely wooded with small timber that it was found easier to wade in the bed, although the water was almost waist high in places.

Rock in place was infrequently seen, and there appeared to be either a fine-grained, dark igneous variety or a very highly altered argillite in the creek bed. All the wash was composed of igneous rocks, chiefly fine-grained, though with occasional very coarsely crystalline boulders showing a large percentage of hornblende.

July 15th.—Camp was broken at 6:30, and an old blazed trail followed, which became so obscure as to be difficult to trace. The country here is comparatively easy, the valley widening out to two or three miles in places, but the soil is gravelly and not of much use for agriculture. The trail followed the west side of the river, leaving it at places to the left for a distance of about a mile. The timber passed in the morning was chiefly small black pine of no value, and extremely difficult to get through without a regular trail, which could be made at slight cost.

About five miles below Nevertouched creek the East fork of the Kettle river enters the main stream from the east. This is one of the most important tributaries, and extends for 20 to 30 miles in a north-easterly direction, rising in about the same vicinity as the North fork, which flows in at Grand Forks. The hills along its course appear, and are reported as being, chiefly granite. Some prospecting has been done up the valley of this stream of recent years, a new trail being found, but it could not be learned that any important mineral deposits had been discovered.

From the point where the East fork enters, the main valley widens considerably, some fairly good bottom land, with heavy timber, occurring along the river.

From the East fork down there were found to be a succession of pre-emptions taken up in this section; these, however, had been located and re-located, no work of any description being in evidence further than one small cabin, not roofed in.

After about 5 hours' travel, during which a distance of about 9 miles was traversed, the mouth of Canyon creek was reached, where camp was made for the night and the horses turned out. Canyon creek, as the name implies, enters the main valley from the west through a canyon, the sides of which are nearly perpendicular and not over 200 or 300 feet apart at the entrance. This creek has lately and erroneously been called Copper creek by certain prospectors who found showings of copper ore thereon.

The south side of the creek is so steep that no trail is there possible, but on the north side a rough one has been made over rock slide from the cliff, at an elevation of 200 feet above the stream, and along this it was possible, although rather dangerous, to get a horse. Once past the canyon, which is about half a mile long, the creek valley widens out, that is, the hills take on gentler slopes which are fairly well timbered.

The rock formation on either side of the gorge is of igneous origin, a fine-grained dark diabasic rock inclined in places to be porphyritic in structure, and very similar to the rocks noted further north and near the heads of those creeks flowing in from the west. This rock apparently overlies the granite from this point as far as to the valley of the main river.

The trail up the creek valley was followed for about 4 miles, and, particularly at the upper end, bore evidence of having been made as assessment work on some claims.

It had been learned from the Mining Recorder that the *Lottie F.*, *Messina* and other properties had been recorded as in this basin, but a diligent search all the afternoon failed to discover their location.

Information from prospectors would indicate that on the *Nettie L.* a fairly good showing of copper ore—bornite—had been made, but that the development was as yet slight. A sample was afterwards obtained, said to be from this claim, and running high in copper but with very moderate gold and silver values.

July 16th.—Camp was moved on this date from Canyon creek to Slate creek, a distance of about 10 miles, the trail running along the valley bottom, here from one to two miles wide and well and heavily timbered for the most part, the soil here being deep black mould, well suited for agriculture. At Slate creek, on D. Dockstadter's pre-emption, this mould is over 10 feet deep by actual measurement. The trees are large and well suited for timber; in fact it looked as though many of the pre-emptions had been taken up in this vicinity more for the timber than with the intention of farming.

The rock formation on the east side of the river is apparently exclusively granite, at least such are the exposures on the hills, which rise steeply to an elevation of 3,000 to 4,000 feet above the valley. On the west side the hills slope back more gradually and are covered with wash and well timbered. An examination of the bed of Slate creek failed to disclose any slate or other sedimentary rock, all the gravel being of evident igneous origin.

About 5 miles above Slate creek, Hamilton creek, a small stream of about 50 miner's inches, enters from the west, while Boulder creek enters from the east, having its source in the granite hills separating this watershed from that of the north fork of Kettle river. There is reported to be a trail marked out going up Boulder creek, over the summit and coming out at or near Eholt. This trail is used by prospectors in summer, but is said to be rather rough.

On *July 17th* camp was moved some 13 miles, from Slate creek to Canyon City, a townsite on which there were two houses, then vacant, situated on the main river at the base of what is known locally as Horseshoe mountain. Below Slate creek the river hugs the hills on the east side of the valley, these hills being steep but fairly well timbered. The valley retains its width for some distance but afterwards narrows in places. The hills on the west side are not so steep, are wooded in occasional patches and provide good pasturage towards the comparatively level plateau at their summits, about 1,000 feet above the river.

Gold Rock Mineral Claim.

About two miles above Canyon city and on the side-hill along which the trail runs there was found the first serious attempt at mining encountered on the trip down the river. This claim was located by A. F. Thomas, on July 9th, 1899, but it was evident that such work as had been done was performed prior to this date. The claim was said to be a re-location of the *Belcher* mineral claim. A comfortable cabin, etc., had been erected, but there was no evidence of its having been recently occupied. The work done consisted of a shaft at least 50 feet deep, but filled with water to within 35 feet of the top. In addition to this there were two or three open cuts about 50 feet lower down the hill.

The country rock here is a fine-grained dark igneous rock with crystals of iron sulphides scattered through it. The work done at the shaft discloses a quartz vein split into two branches near the surface but joining at a depth of some 15 feet. The south branch is from 6 to 12 inches wide, the other from 12 to 18 inches, and these, after uniting, appear to pinch out at 30 feet in depth. The quartz on the dump was sampled and on assay gave $52 in gold and one ounce in silver.

On *July 18th* camp remained at Canyon City, the day being spent in inspecting claims on Horseshoe mountain, under the guidance of a local prospector, H. B. Thorn, who kindly offered his services.

MINERAL BELT.

It is apparent from the locations that have been made, some of which will be described later, that there is a mineralised belt extending from the Kettle river valley at about Canyon City, in a westerly direction across country to the headwaters of the West Fork of this stream, passing through Beaverdell and Carmi and probably continuing in the same line at least as far as the Osoyoos valley.

Although the actual contact could not be found, it was noted that just about this point there was a change in the general formation, in passing southward, from the fine-grained igneous rocks of the upper Kettle river to altered sedimentaries, and still further south to quite unaltered sedimentaries, while at Rock creek there was an occurrence of coal formation.

The values so far found are chiefly in gold, in association with iron sulphides, usually arsenical. Some galena has been discovered and where found is quite high in precious metals, but as it is usually associated with iron sulphides it is not very clear just where the values are carried, not that it matters much from a practical standpoint.

Copper and zinc sulphides also occur as associated minerals, but not in quantities to be of value as such alone. The geological conditions along this belt seem very favourable for the occurrence of mineral, and such superficial work as has been done indicates that the ore found carries good gold values, so that taken altogether the section is well worth the serious attention of the prospector.

HORSESHOE MOUNTAIN CAMP.

Montana. Mineral Claim.

This claim, owned by Messrs. Waddell and Sullivan, is situated on Horseshoe mountain, at an altitude of about 3,800 feet, and some two miles from Kettle river. It is reached by a trail from Canyon City. Here a tunnel has been driven in for 70 feet to the east, with a winze, which has been run in on about 6 feet of black shaley material occurring between two slip walls in a fine-grained igneous country rock. These walls have a strike nearly E. and W., with a dip of from 30° to 50° to north, and the filling between them, as is also the country rock to a lesser extent, is mineralised with iron sulphides, while irregularly distributed through this filling are lenses of quartz of varying sizes, carrying chiefly iron sulphides, but occasionally copper pyrites, galena and zinc blende. The values found are said to have been chiefly in gold and silver. Samples were taken of the material on the dump, and upon assay gave $8 in gold and 6 oz. in silver per ton.

In an open cut, some 100 feet to the south, there is shown in a parallel ledge about 24 inches of quartz, which did not carry any particular mineralisation, and which, upon assay, gave traces of gold and $\frac{1}{2}$ oz. per ton of silver.

In a further open cut, apparently on a third ledge, also parallel, there is a quartz lead about 24 inches wide, somewhat shattered, associated with calcite and having mineralisation as in the tunnel. It was noted, however, that the country rock was here somewhat different, being a very fine-grained, acid, igneous rock.

4th of July Mineral Claim.

This property, owned by Messrs. Waddell & Sullivan, is situated on Horseshoe mountain, at an altitude of 3,850 feet, or about 1,350 feet above the valley of the Kettle river, and distant therefrom some 3 miles in a northwesterly direction from Canyon City. This altitude is about the average height of the plateau referred to as lying between the valley of the main Kettle river and that of the West fork. The summit of Horseshoe mountain resembles an elevated range of low, rounded hills rising out of the general level of the plateau.

There was found on this property a tunnel running about north for 30 feet, at which point, and extending across it, there was a winze filled with water, so that it was impracticable to proceed further. The tunnel, it could be seen, however, continued some distance further, deflecting to the east.

The country rock is here of igneous origin, fine-grained and probably a diabase. Very little mineral was visible in the tunnel as far as it could be inspected, but on the dump there was a quantity of pyrrhotite said to have been found in the winze. A sample of this was taken and gave values of $2.50 in gold per ton.

The *Kingston Hill* properties, owned by Mr. Robert Wood, were noted, but the work had been done here in open pits 10 feet deep, and was of such a character that no idea could be formed of the value of the property.

O. K. Group.

This group consists of the following mineral claims, viz.—*Oro Fino*, *O. K.*, *Ivanhoe*, *Liberty*, and *Tip Top Fraction*. It was located in 1897 by H. B. Thorn and C. Matheson, in what is locally known as Triple Lake camp. The property is situated on bare, rolling hills, and while it has received considerable surface prospecting the work is as yet too superficial to allow any definite idea to be formed as to value of the deposits.

On this group there appears to be a contact between the granite and the fine-grained igneous rock (probably diabase) already mentioned, which is accompanied with a shattering of the latter, following the line of what appears to be a hornblendic dyke, and a subsequent formation of numerous quartz stringers, together with the deposition by replacement of considerable masses of pyrrhotite with some arsenical pyrites. This shattered zone has a strike about N. 60° W. magnetic, and would appear to have a width of about 100 feet.

The development work consists of large, shallow open pits or trenches. The first pit is 12 feet deep, showing a considerable quantity of pyrrhotite and quartz in the shattered mineralised zone. Selected samples of this give $11 in gold per ton, but the average value would be nearer $5 per ton. The second pit is about 10 feet deep and shows stripped a considerable mass of pyrrhotite. In the third pit, which is about 100 feet from the last mentioned, there is, apparently, a continuation of the ore body therein exposed.

On the *Ivanhoe*, one of this group, there had been exposed a quartz vein, from 10 to 12 inches wide where tested, which carried free gold and which on panning gave numerous colours. A sample was taken of this quartz and yielded on assay $14.40 per ton in gold, with a trace of silver.

Mogul Mineral Claim.

This claim is situated on the eastern brow of Horseshoe mountain, and is owned by R. Roberts *et al.*, of Greenwood. The country rock here is granite, in which there evidently occurs a quartz vein, but of what width could not be determined from visible surface workings, and the shaft could not be descended for any distance.

The shaft referred to, which has been rather irregularly sunk, is some 8 x 12 feet in cross-section, and, as near as could be measured, is 40 feet deep. It was stated, but could not be verified, that in the bottom the ore was about 7 feet wide, consisting of quartz with iron pyrites scattered through it, and constituting a concentrating proposition. The quartz, it is claimed, has run as high as $50 per ton in gold. A rough general sample taken off the ore dump gave $20.40 in gold and 1 oz. in silver per ton. Over the shaft was the usual windlass, covered with a rough pole shed. The ladder was suspended by a rope attached to a rung, and in an overhanging position. The property was idle at the time it was visited, work having been stopped upon a serious accident to the foreman, said to have been caused by faulty ladders.

Silver Dollar Mineral Claim.

This claim, also on Horseshoe mountain, is owned by Messrs. C. Newman and Jacob Peterson. The work done here consisted of an adit tunnel in the hillside, about 20 to 25 feet long, at the inner end of which a raise had been made to the surface, while a winze had been sunk for some 15 or 20 feet, from the bottom of which it was evident a drift had been started. This winze was full of water up to the level, and could not, therefore, be examined, but it was reported that a quartz vein had been struck carrying high gold values.

The country rock is fine-grained, of igneous origin, probably a diorite, and is impregnated with iron pyrites. Such of the workings as were open to inspection did not disclose the vein said to occur in the winze, but on the dump there was considerable quartz which was sampled and gave $16.40 in gold and .6 oz. in silver.

On the *Morning* mineral claim, a re-staking of the *Echo*, and having the same owners as the last mentioned, no vein or lead was apparent, such work as could be seen having been done in iron-stained country rock.

Monitor Mineral Claim.

This claim lies adjacent to the *Silver Dollar*, and is held by Peterson & Millan. The development is quite superficial, consisting of a tunnel and open cut, and the lead, which would appear to be a mineralised band in the diorite country rock, is 3 to 4 feet wide, containing stringers of quartz and mineralised with iron and copper pyrites. A sample of ore from the showing gave $14 in gold and a little silver.

Bonita Mineral Claim.

This claim, on the east slope of Horseshoe mountain, is owned by Larsen & Swansen, and shows an irregular lead carrying fair quantities of arseno-pyrites with copper and iron pyrites. A sample taken of the ore gave $18 in gold and .75 ounces of silver per ton.

The development work consists of two shafts, 40 and 14 feet deep respectively, an open cut and small shaft, and an inclined shaft of about 25 feet, in each of which there appeared some ore, but so irregularly that, with the work done, no definite idea could be formed of the mode of occurrence further than that it seemed to be a replacement, in places, in a shattered zone of the country rock.

July 19th.—Camp at Canyon City was broken at 8 a. m. and Westbridge was reached at 5 p. m., a journey of 20 miles by a fairly good waggon road, recently constructed by the Government. Several ranches were passed during the day, located in the river bottom, which here in places widens out, leaving beautiful flats which appear to be highly productive. The hills on this side of the river are low and rounded, giving some, though not much, grazing ground thereon.

The waggon road follows the side-hill on the west of the valley most of the way, occasionally descending into the bottom, but when within a couple of miles of the junction of the West fork the road, for some reason, climbs over a range of hills on a very steep grade and joins the West fork waggon road about half a mile above the town of Westbridge. This is a collection of some dozen houses with a hotel, store, post office, blacksmith shop and the office of a Deputy Mining Recorder, situated on the West fork about three-quarters of a mile above its mouth and half a mile above the bridge.

Camp was made on the bank of the main river about half a mile below the forks, as the only place available where both feed and water for horses were to be had.

July 20th was spent in camp. Mail matter, requiring attention, had been forwarded and was found at Westbridge.

July 21st.—The pack-train remaining at the forks and saddle horses only being taken, camp was left at 7 a. m., and by riding until 4:30 a distance was accomplished of 32 miles, up the West fork as far as Carmi. A good waggon road is under construction, but had, at the time, only been completed in places, so that the trail had to be followed for much of the distance and the river forded several times on the way.

The town of Carmi, situated on the West fork at the junction of Carmi creek, is so named from the principal mineral claim on the adjacent hill. It consists of a good hotel, two stores, a saw-mill and some 15 or 20 houses, and is the point of supply for the prospectors in the neighbourhood, quite a number of whom winter here.

From Carmi there is a good trail over the comparatively low summit to Okanagan lake at Mission and Penticton. This was the route formerly taken to reach this section of country, and now a considerable amount of the supplies for the camp come in this way by pack-train.

A charter for a railway from Midway to Vernon has been recently granted by the Provincial Legislature. This, as surveyed at present, would run up the West fork past Carmi and thence up Wilkinson creek.

Carmi Mineral Claim.

The best known mineral claim in this section is the *Carmi*, owned by the Carmi Mining Company, of London, England, of which Mr. E. H. Thurston is manager. The property had not been worked in 1901, but had been operated previously, with Robert Langley as mine manager. When visited it was nominally in charge of a boy as caretaker, who asked Mr. J. C. Dale, the original locator of the property, to act as guide about the workings, as no official of the company was in the camp. The *Carmi* and several other adjoining properties were located in 1896 by Mr. Dale, who sold this claim to the above company in 1900. Since then the management has located a small fraction, the *B. A.*, just adjoining the *Carmi*, higher up the hill.

The "discovery" had located, near the foot of the hill, a quartz lead some four to five feet wide, which was subsequently traced up the hill along its strike, S. 60° W., by a series of open trenches and pits. Such work proved the lead to be continuous, although subjected to a number of small faults, and fairly uniform as to size, although the visible mineralisation varied considerably in the different cuts, as might be expected.

This main lead has been traced nearly the whole length of the *Carmi* claim and through the *B. A. Fraction*, belonging to the same company, whence it is again followed into the *Butcher Boy* and *May* mineral claims, immediately adjoining and higher up the hill.

The vein, taken as seen on the various properties, occurs in an igneous country rock, coarse grained in places and probably a diorite. In this country rock there is a fine grained, hornblendic dyke, in the centre of which, and running with it, is found the quartz vein in question. This is noted as clearly defined in some of the openings, though not in all, but it seems strongly probable that the vein is directly associated with the dyke in question throughout its course.

On the *Butcher Boy* there is exposed, at a distance of about 400 feet from the main lead, a second quartz vein, which is apparently parallel with the former, and is probably continuous through the other properties, although it has not been proved thereon. This second lead is not identified with any marked dyke, and is not so strong nor, apparently, was the mineralisation as great as in the main lead. The main lead carries, associated with the quartz, iron sulphides, chiefly pyrites, some galena, zinc blende and a little copper, the values being chiefly in gold and silver.

Between 800 and 1,000 tons of ore have been shipped to the smelter from the *Carmi* at considerable expense, having been taken out to Greenwood by waggon. This ore, which was of course selected in mining and to a certain extent hand-sorted, yielded a little better than $20 in gold and 4 oz. in silver per ton. Of course, such shipment was made principally as a large sampling, and it is probable that the method of treatment best suited to the ore will be concentration on the spot and a shipping of the concentrates, which promise to be quite high in values and can easily stand any transportation charges. A very good site for a concentrator, with plenty of water for milling purposes, and probably quite sufficient also for power, exists on the main west fork, just below the property.

Development work. On the lower half of the *Carmi* claim there is a tunnel in on the lead S 60° W. for a distance of about 85 feet, the vein therein being fairly regular and continuous with a showing at the face of about 4 or 5 feet of quartz which might be classed as good ore. A few feet from the mouth of this tunnel there was a shaft, at that time filled with water, which goes down vertically for a short distance, and then, it is said, slopes further into the hill, gaining a total depth of some 100 feet.

These workings were near the original discovery point, and, as already noted, from here up the hillside to the main shaft are various open cuts on the lead. The main shaft has been sunk within about 100 feet of the upper (western) edge of the *Carmi* claim and follows the vein, dipping 60° to south. At the 30-ft. level there was a drift off to the right for about 30 feet, with some ground stoped, the drift and stope extending altogether for from 50 to 60 feet and connecting with the surface. The shaft was filled with water to within 50 feet from the surface and could not be further examined; it is reported, however, that it continued to a total depth of 110 feet, and that at the 100-ft. level drifts had been run to the left for 117 feet and to the right for 111 feet.

The shaft is well timbered and equipped with ladders, etc. The steam hoisting plant is small, but quite sufficient for some depth yet. A Cameron sinking pump is also in place, and is quite able to handle all the water the mine makes. The management has purchased an air rock drill, which it is proposed to use with steam as a motive power instead of air, although this, it is understood, has not been attempted as yet. The shaft and hoisting plant are covered over with a rough board roof without sides.

The ore sheds are constructed of round poles, the siding also consisting of round poles placed in position as required, the whole being conveniently arranged both for receiving the ore from a tram overhead and for the delivery of it into waggons for shipment. While this structure makes no pretence to be other than a temporary one, it is admirably suited for the purpose intended, and is the first of the sort noted in the Province; it is, indeed, well worth the attention of other claim holders. Much of the detail of the plant can be obtained from the accompanying cut. Bunk houses, etc., for the men have been built at the base of the hill, on land adjoining the town.

Butcher Boy and May.

These claims, owned by J. C. Dale, of Carmi, are, as already noted, immediately adjacent to the last mentioned, and are on a direct continuation of the same lead. The main shaft of the *Carmi* is situated so near the boundary of the *Butcher Boy* that it really develops this claim almost as much as though actually on the property. The only other developments on the property are the open cuts and trenches already noted, in which it seemed as though there was possibly a little more copper showing than on the *Carmi*. A rough sample, taken from the lead in one of the cuts, gave $6.40 in gold and 9 oz. in silver to the ton, and 4.2 % of copper.

Directly south of the *Butcher Boy* is the *No. 3* claim, and south of the *May* is *Keeley's* claim. These do not appear to catch the main lead, though they may contain parallel leads which, though not definitely developed, are indicated by superficial work.

St. Lawrence Mineral Claim.

This claim was staked on June 1st, 1901, and, as far as could be determined on the ground, was a relocation of the *King* mineral claim, located in 1897. The owners are Messrs. King & Morrison. The property lies on the Penticton trail, about one mile from Carmi and on the opposite side of the creek from the previously mentioned claims.

Over an area of about 200 feet square, as exposed by a series of shallow pits and trenches, there is shown to be quartzose matter, containing throughout it a small percentage of iron sulphides associated with a fine-grained, light coloured, acid country rock. The work done is not sufficient nor of a character to give any definite idea of strike, dip or origin of the deposit, but the indications seem to show that it is a very highly siliceous dyke, mineralised in places and carrying certain values in gold.

Detroit Mineral Claim.

The *Detroit* mineral claim, situated near the preceding, is owned by Mr. J. Gannon. The development work consists of 2 pits about 12 and 10 feet deep respectively, and some small open cuts. The country rock here is a granite in which occurs small and irregular quartz veins. Samples were obtained showing copper sulphide ore, but as yet the quantity of such is not important.

On the *Rossland* mineral claim, owned by D. R. English and B. Scully, a shaft has been sunk for about 15 feet in crushed rock and slide, seemingly a shattered granite, in which occur kidneys of copper pyrites with some carbonate of copper, which is probably superficial. As yet, however, ore in workable quantity has not been found.

July 23rd.—The Provincial Mineralogist left Carmi at 8 a. m., taking a trail leading up the West fork past the mouth of China creek, and by the west of Wallace lake to Knob hill, as it is locally known, a rounded mountain directly at the head of the valley of Beaver creek, the latter being another tributary of the West fork flowing in about 5 miles below Carmi. The day was spent visiting claims on this mountain, and Beaverton, as it was then called, was reached at 9.30 p. m. This townsite, which is laid out on Beaver creek, about a mile and a half from the mouth, and Rendell, another townsite at the mouth of the creek, have since been amalgamated under the name of "Beaverdell."

Knob Hill Camp.

The following claims in this camp were visited :—

Knob Hill Mineral Claim.

The *Knob Hill*, owned by Cousins & Hennesey, of Greenwood, is situated at the head of Beaver valley, at an elevation of about 4,600 feet, or about 1,700 feet above the valley. In an open cut 10 feet long by 4 feet deep there is exposed a so-called "iron cap," containing iron sulphides and probably a little copper, but not of commercial importance.

There is also a shaft, some 40 feet deep, sunk in a light coloured, acid, igneous rock, with which is associated a dark, basic dyke, containing a very large percentage of iron; and it is probable that the decomposition of this and similar dykes constitutes the "iron caps" of the camp. There was reported to have been a good showing of copper sulphide ore on this claim, but none such could be found further than that the rocks were stained with copper. A sample taken from the workings gave an assay of ½ % of copper and a trace of silver and gold.

On the *Justina* mineral claim, owned by — McBoyle, in a pit some 8 feet deep, there was an exposure of "iron cap," already referred to, and some pyrrhotite, with a small percentage of copper, although not of any importance. A sample taken for assay only gave traces of the precious metals.

Rosalie Mineral Claim.

This claim, owned by McBoyle, Wood *et al.*, is situated on the Beaver creek slope of Knob hill, at an altitude of 4,750 feet. The rock formation here is still igneous, diorite and granite, with other highly ferruginous dykes, which weather to "iron cap."

In a pit 6 feet deep there is a small mass of quartz, running off into a stringer of 2 inches, but the work done is so slight and the exposure so near the surface and so broken up that no idea could be formed of the deposit. The surface was covered with underbrush and timber, and the formation could only be seen where the prospect pits had exposed it.

In an open cut near the cabin there is exposed for 10 to 12 feet an outcropping of almost solid pyrrhotite, showing from its weathering that it contains a large amount of arsenical iron, while, a short distance to the east, there is a second exposure of a similar body of ore. These bodies have the appearance of being continuous, but the work done was then only such as to actually prove it as already stated. The values said to have been derived from various assays were chiefly in gold, and ran from $10 to $40 per ton. To check these a sample of the mineral as exposed was taken, and this gave on assay $40 in gold, $\frac{2}{10}$ oz. silver and $\frac{1}{4}$ % copper. Some 200 yards lower down the hill there is an open pit almost 15 feet deep, showing a silicified blanket near the surface of from 2 to 4 feet thick, slightly mineralised with arsenical iron and pyrites, and reported to assay from $2 to $4 per ton in gold. A third pit, 15 feet deep, with an open cut was noted, in which there was the appearance of a defined wall with quartz following it down. As yet no assay had been taken from this working. There is unquestionably extensive mineralisation at several places on this property, and very good values have been obtained, but at present the development is too superficial to show whether mineral will be found sufficiently concentrated and in such quantity as to be classed as ore.

Elsworth Mineral Claim.

This claim is held by Doare & Harris, and is situated on Knob hill, at an altitude of 4,900 feet and about 7 miles north of Beaverton. The property created much excitement in the camp last summer and was known as the "*Big Strike.*"

The work done is as yet entirely superficial, not much more than stripping off the surface débris, but it has exposed for some 70 feet a large blanket of quartz, under which lies a big mass of iron sulphides, largely arsenical, and which, it was reported, contains gold values.

The extent of this body of sulphides is certainly considerable, but could not be determined with any definiteness from the work done, nor could any defined walls or boundary be found. It appears only as a large deposit of unproved size or form. There were indications that, if the body referred to proved to be a lead, the strike would probably be found to be in a direction almost south into the *St. John*, the adjoining mineral claim. A fairly average sample of the sulphide ore body was taken for assay and gave 50 cents in gold and 3 oz. in silver per ton. The quartz underlying the ore body is iron-stained, but does not appear to carry values.

The *St. John* is a Crown-granted mineral claim, held by Collyer, Thompson & Sterling, and lying adjacent to the previously mentioned property. The conditions here are similar to those in the preceding property, though there is not exposed in the workings any such large body of sulphides.

Beaver Mineral Claim.

This property is also situated on Knob hill, at an elevation of 4,600 feet, and is nearer to Beaverton. There appears to be on this property a contact between a diorite or other fine-grained igneous rock and a light-coloured granite. In an open cut, 15 feet x 10 feet, by 6 feet deep, there is exposed a body of iron sulphides, arsenical iron and copper pyrites, mixed with quartz and about 7 feet thick, from which assays have been obtained of about $4 in gold and 2 % in copper. Overlying this ore body there is, apparently, a blanket of quartz some 2 feet thick, which does not appear to carry values. The property is as yet in the early stages of a prospect, and the work done so far really proves nothing definitely, but such development as has been accomplished gives considerable promise of success.

July 24th.—Beaverton and Rendell were, as already mentioned, two rival townsites in the valley of Beaver creek, within a mile and a half of its mouth. These, it has since been learned, have been sensibly amalgamated under the combined name of Beaverdell. There is here the chance for one good town to exist, but not for two—certainly at present. Each of the towns at the time they were visited consisted of a hotel, store and a few houses, with a saw-mill at Rendell.

Beaver creek valley is about half a mile wide, with fair timber and very good agricultural land for about 6 miles up, the hillsides in places giving good grazing ground. In the morning the saddle horses, which had been turned into a fenced pasture the previous night, could not be found, and were lost long enough to necessitate the climbing of the hill on foot, leaving one of the party to find them, which he did in a very short time.

The properties in the immediate vicinity of Beaverdell, in addition to those noted yesterday, are mostly on the hill lying to the east of Beaver creek, locally known as Wallace mountain, and separating this watershed from that of the Kettle river at Canyon City; in fact, some of the claims above Canyon City are on the Beaver creek watershed, and it was reported that there was a trail from the former place to Carmi only 9 miles long, which means about 7 or 8 miles to Beaverdell.

The country rock of Wallace mountain is chiefly granite and diorite, somewhat faulted where noted, and intersected by dykes of dark, hornblendic matter, or other highly ferruginous material. The whole hill appears to be cut by a series of small but well-defined quartz veins, rather irregular as to width and somewhat faulted. These seem to carry good values in gold and silver in some places, while in others they are quite barren. The developments did not show to what cause these local enrichments were due, nor did the time available permit of any close study of the same, but it is strongly suspected that the mineralisation is closely associated with the secondary irony dykes.

The development work so far accomplished in the camp is very superficial and unsatisfying, but the values obtained are so good and the leads are so distinct, though broken, that the camp may be considered as having considerable promise when it has been properly prospected, as it undoubtedly will be as soon as the contemplated railway becomes an accomplished fact. The properties now developing have been reached from so many points that no definite trails could be found connecting them; indeed, it was with great difficulty that such claims as were found were reached, and many had to be overlooked. Those described will serve more as an index to the camp than as a full description.

Wellington Mineral Claim.

This claim, owned by Copley *et al.*, is situated on Wallace mountain, as the range of low-lying hills to the east of the Beaver valley is called. In an open pit, from 6 to 8 feet deep, there is exposed a fairly well-defined quartz vein from 8 to 12 inches wide, cutting through a granite country rock and carrying a considerable quantity of galena, in which it is reported high silver values have been found.

Some 200 feet higher up the hill, in a 4 by 6-foot pit, there is exposed a quartz vein, well defined and from 6 to 12 inches wide, carrying galena and some lead carbonates. A sample of the fine-grained steel galena from this pit was taken for assay and gave $2.40 in gold and 74 oz. of silver to the ton and 52.5 % lead. The veins developed are small and somewhat faulted, though apparently quite persistent. The assay value of galena contained is fair, but the quantities present in the workings were not sufficient for commercial operations, although the property is regarded as having some promise.

Sally Mineral Claim.

This property is probably the best known in the camp, and is situated on the hill, about a mile below Beaverton, at an altitude of 4,350 feet. It is reached, at present, by a direct trail from Beaverton, but a waggon road has been surveyed from the claim to the valley, by which it is proposed to ship the ore. The claim is owned by the Vancouver & Boundary Creek Development and Mining Company, Limited, of which Mr. Robert Wood, of Greenwood, is president and manager.

The development consists of various open cuts, etc., and a tunnel driven in a quartz ledge for some 178 feet, from the end of which a cross-cut has been made to the left for 19 feet. This tunnel had good ore in both floor and roof for the first 10 feet of its course. At this point, however, a fault plane occurred which cut it off, and the tunnel ran in country rock for some distance, and was then deflected to the right, the ore coming in again from the right side and continuing for some 35 feet, when it was again cut off and had not been found at the time the property was visited, though a drift of 19 feet had been made to the left to catch it. On this 35 feet mentioned some stoping had been done above the level and considerable ore taken out, but the ore chute had tapered off to nothing above, probably cut by the same fault plane noted in the tunnel.

On the face of things the present showing is not favourable, but there are evidences in the tunnel which render it likely that at each of the fault planes referred to the vein has been thrown to the right, not to the left as evidently supposed by the management, and it is probable that a cross-cut to the right might again find it. It is suspected, however, that the ore will be found to run in the vein in chutes, and, if this theory is correct, the size of the chutes will have to be demonstrated before an estimate can be made of the value of the property.

From this tunnel, chiefly from the stope referred to, some 20 tons of selected ore were shipped, running about 150 ounces in silver per ton and about 7 % in lead. A sample taken of the best ore to be found in place at the time gave, on assay, 322 oz. silver per ton and 13 % lead. The ore has the appearance of being chiefly galena, but the assays show so small a percentage of lead that it is probable that much of the silver value is contained as a sulphide of silver or some such ore, although this was not particularly noted at the time. There is on the property a bunk house and office, an ore shed, blacksmith shop, etc.

The *Excelsior* mineral claim lies just south of the *Sally*, and the *Nodaway* mineral claim is south of the *Excelsior*, and has a quartz lead from 8 inches to 12 inches wide, with some galena, while the *Duncan Fraction* is still further to the south. All these properties are but very slightly developed and are unproved. The ore is galena, in quartz veins of small size as far as developed.

The *Rambler* mineral claim is on a quartz vein, supposed to be identical with that of the *Sally*, and certainly similar in many respects. An assay of ore therefrom gave gold, trace; silver, 55.4 oz. per ton, and 25.1 % lead. The property lies considerably to the south of the *Sally*, at almost the same elevation and on the opposite side of Dry creek.

Washington & Idaho Mineral Claims.

This property is situated over the summit of the hill, at an elevation of 5,050 feet, and about one mile east of the *Sally*. Here, as far as could be made out from the very irregular surface workings, there is a dyke from 65 to 70 feet across, cutting through a diorite country rock, and on either side, at the contact of the dyke and the country rock, there is a crushing or decomposition of the former—on one side for a width of from 3 to 4 feet, and on the other for 6 to 8 feet, as exposed in the workings—and in this there occur lenses of galena, more or less regularly disseminated in an oxide of iron gangue, and of unproven extent. A rough sample taken by breaking off small pieces over the pay-streak gave on assay 19.5 % lead and 8 oz. silver per ton. The dyke and leads have a strike about S. 20° E. and a dip nearly vertical.

Between the two leads, viz., almost in the middle of the dyke, a shaft has been sunk vertically for 108 feet, from which it is reported no cross-cuts had been run, but as it was full of water this could not be verified. It was evident, however, from the dump, that the shaft had been in dyke matter all the way. The leads on each side of the dyke had apparently not been even prospected for a depth greater than 10 to 12 feet, and why a shaft should be sunk so far without cross-cutting to prove either is a mystery. The wood work and blacksmith work in the timbering of the shaft, the windlass and the partly constructed buildings are exceptionally good, but the mining is past understanding.

Some 400 feet from the shaft referred to there is a second one 35 feet deep, with a 15-foot cross-cut and a large open cut 10 feet deep, indicating a continuation of the leads thus far, but giving little additional information as to the value of the property. It might be said, however, that these last-mentioned workings are the older.

July 25th.—A start was made from Beaverton at 8 a.m., arriving at the Half-Way House or West's Hotel, where refreshment for man and beast was found, at 11:30; thence on to Westbridge, a total distance of 28 miles, reaching camp at 4:30.

A stop was made during the afternoon at what is known as *Boomerang camp*, which is about 8 or 10 miles up the West fork from Westbridge, at and about the mouth of Boomerang creek, a small stream which flows in from the north. There are here a large number of locations, but very little work has been done on any of them. The general character of these deposits may be said to be iron sulphides carrying values in gold and occurring in small quartz veins in granite, porphyry, or other igneous rock.

Of these claims, the best known is the *Iconoclast* mineral claim, commonly called *Gallaway's* claim, situated opposite Boomerang creek and reached by a trail from the waggon road. This property was not being operated and the workings were so filled with water that nothing further could be learned by a visit to it. Good values are reported from samples, but the quantity of ore is still undetermined.

The *Enterprise*, owners S. Ray *et al.*; the *Richelieu*, owners Gaines *et al.*; the *Keystone*, *Mammoth*, *Monte Christo* and the *Ohio Group*, Strong and Kelly owners, all show quartz veins carrying iron sulphides with gold values, in the last property said to amount to about $11 per ton, with occasionally some free gold showing.

July 26th.—In the morning camp was moved to Rock creek, a distance of eight miles by road. The valley here opens out in places into extensive and fertile flats, and the hills on the east, near Westbridge, are abrupt and rocky, but as Rock creek is approached they become more gradual in their ascent, affording good grazing ground for large herds of cattle. The hills on the west side of the valley are abrupt, tree covered but barren, and generally composed of comparatively recent volcanic rocks, which, as Rock creek is approached, are found overlying the sedimentary measures, which here include the coal measures of the district.

Rock creek was, in the early sixties, the scene of important placer mining, and a considerable amount of gold was taken out. The extent of these old workings can now be seen for about a mile above the mouth and at certain spots higher up the creek. At present all these claims and leases have been allowed to lapse by the white men, but a number of Chinese were at work on the high benches, shovelling down into sluices in the bed of the creek, and making a small annual output, scarcely amounting to wages.

Big Eddy.

On the east side of the Kettle river, about two miles above Rock creek, there are five or six mining claims, which have been seriously prospected. Of these the best known is the *Big Eddy*, a Crown-granted mineral claim, owned by Hugh Reed *et al.* The No. 1 post of this claim is on the river bank, the centre line running N. 30° E. At the level of the river there is a tunnel driven 27 feet S. 10° W., showing a small quartz vein with a strike S. 10° W., dip 45°, in a country rock which appears to be a somewhat altered diorite, much shattered, and with small quartz stringers through it, the mineralisation and silicification extending into the adjacent rock.

An upper tunnel, some 40 feet above the river level, starts on a vein approximately parallel to the above, which is eight inches wide at the entrance, but pinches to about one inch at 75 feet in. This tunnel, which has been run in 120 feet in all, also cuts a second and smaller vein, supposed to be the same as that occurring in the lower tunnel. The quartz carries galena and pyrites scattered through it, and a selected sample of the ore gave on assay $4.40 in gold and 22 oz. in silver per ton.

Commonwealth Mineral Claim.

This claim, having the same owners as the above, lies to the N. E. of and adjoining the *Big Eddy*. On the surface there is a heavy iron capping, but the strike of the ore body was not apparent. The conditions are about the same as in the previously mentioned property. A shaft has been sunk for 100 feet, with a drift of 85 feet at the bottom.

The *Brooklyn* mineral claim, having the same owners as the above, has a shaft sunk 14 feet in a mineralised iron capping, but showing no defined ore body.

Riverside Mineral Claim.

This claim lies directly to the south of the *Big Eddy*, and is owned by Benj. Perkins. The ore body here appears to be silicification and mineralisation of a sheared zone in the same country rock, with a dip of 20° and strike N. 25° W. The hanging wall is well defined but the foot wall has not been uncovered. The mineralisation consists of galena, pyrite and some copper. The owner reported shipping some 10 tons of ore selected from double that amount, which is said to have yielded $40 per ton gross, of which amount $5 was in gold. A sample taken of the clean ore gave on assay $2.40 in gold and 47 oz. in silver to the ton.

At the river level a tunnel had been run in for some 30 feet N. 85° W., while some 60 feet above the river an incline had been sunk on the ledge for 40 feet.

Some 100 feet above the river is ledge No. 2., a quartz vein three inches thick with a strike N. 15° W., carrying arsenical iron pyrites.

Ledge No. 3, as it is called, is a seam of decomposed quartz about six inches thick, varying as to dip and strike, and carrying galena and lead carbonate, from which an assay of 119 oz. of silver to the ton is reported.

The *Badger* mineral claim, having the same owner, lies to the S. E. of the *Riverside*. At about 150 feet elevation above the river a shaft, now partly filled, has been sunk for 22 feet, with an 8-foot drift at 15 feet down. There appears to be an 8-inch quartz lead, dip 85°, strike N. 20° E., which is, however, cut off in the drift by a mineralised rock, which is said to have yielded high assays in silver. The quartz carries some visible free gold, but no sample was taken for assay.

Copper King Mineral Claim.

On the west side of, but some distance from, Kettle river and about 3 miles above Rock creek the *Copper King* is situated, at an altitude of 2,900 feet. On this claim is exposed a quartz vein carrying small quantities of pyrite and arseno-pyrite, with some copper stain.

The work done consists of a tunnel driven 40 feet into country rock—similar to that of the previous claims but showing porphyrite dykes. Some 50 feet higher up the hill a shaft has been sunk, which is now filled with water to within 22 feet of the top.

Rebecca Mineral Claim.

This claim, owned by W. Smith and John McKenzie, is situated on the west side of the river about 4 miles above Rock creek, and at an altitude of 4,000 feet. Here there is a quartz vein (strike S. 80° W.) carrying some chalcopyrite, selected samples of the ore running as high as 6 % copper, with a total value of $22 per ton. The work done consists of an open cut and tunnel 45 feet long, bearing N. 74° W.

Copper Prince Mineral Claim.

This claim, having the same owners as and adjoining the last mentioned, was located in August, 1898. A 25-foot tunnel follows in a quartz ledge with a well-defined hanging wall, bearing N. 80° E., with a dip of 75°. The ore is similar to that of the *Rebecca*. The ledge, which cuts through a porphyry dyke, is apparently continuous and can be traced for 1,500 feet by surface outcrop. The width is certainly considerable, but could not be determined.

Chloride Mineral Claim.

This claim, owned by Yankins, Hamilton & Megraw, and located in May, 1897, is situated on the west side of Johnson creek, about 4 miles from Rock creek, and at at altitude of 4,250 feet. The ore and country rock are the same as on the *Copper Prince*, and the ledge appears to be a continuation of the one noted on that claim, as the bearing across the valley to the latter's dump—some 450 feet lower and three-quarters of a mile away—was N. 86° E., nearly the strike of the walls noted in the last-mentioned property. The ledge has been prospected in three places, one of which was by a cross-cut incline 25 feet long and 15 feet deep, in which is seen a well-defined foot-wall, dipping at the same angle as the hanging walls of the *Copper Prince*.

Last Chance.

On the east side of and about a quarter of a mile distant from Kettle river, just opposite Rock creek and at an altitude of 2,500 feet, or about 300 feet above the valley, is situated the *Last Chance* mineral claim. The mine is in the face of a steep bluff which rises from the valley and seems to be composed of a fine-grained, dark, igneous rock, much crushed and silicified by veinlets of quartz cutting through it and filling the fissures. These veins frequently contain masses of quite pure chalcopyrite, but they are too small to be worked separately and too widely separated to be worked together. A tunnel has been driven in for 20 feet, following a quartz vein from 2 to 10 inches wide, but at the face this vein appears to have pinched out. The quartz carries a very fair percentage of yellow copper, a selected sample of which gave an assay of 8.1 % copper, with 1.1 oz. silver and 40 cents in gold to the ton.

Rock Creek Coal.

It had been reported that coal had been discovered at Rock creek and careful investigation showed that the coal formation does exist there. The services of an old resident were kindly offered to show the former workings, which had been abandoned for many years. These workings occur in the bed of the stream, about half a mile up from the mouth, and are said to have consisted of a tunnel 65 feet long run in from the creek bottom, but long since caved in, although a little of the timbering is still standing. This is completely underlying the gravel wash from which the placer gold is obtained, and was probably discovered during the work of placer mining. Directly underneath the gravel there is a bed of fine-grained argillite about 12 inches thick, showing marked banding or bedding planes and lying nearly flat or with but a slight dip. Underneath this there could be seen, for some 10 feet, a coarse-grained sandstone or very fine-grained conglomerate, composed chiefly of decomposed granite rock, through which occur several bands of bituminous coal, probably intermediate in quality between lignite and true coal.

While there is no doubt that coal exists here, at no place examined was there seen any seam of workable size, although, it must be said that the workings were flooded and did not admit of a thorough examination. This coal formation probably extends over a considerable area here, as somewhat similar exposures are reported on Nicholson's farm, some 2 or 3 miles south of Rock creek, and on Christopher's, some 3 miles to the west.

Rock Formation.

The bluff on the west side of the valley, about a mile above Rock creek, presents a most interesting geological section, and illustrates the exact relationship between the sedimentaries, including the coal-bearing formations and the later volcanics, which seem to form such a large proportion of the surface rocks west of the Kettle river—more particularly at the higher elevations—and which extend pretty well to the Coast range of mountains. The lower portion of the bluff is completely covered with heavy wash and slide, and is not exposed at a point lower than about 800 feet above the valley, above which it rises perpendicularly for some 200 feet. In this perpendicular face the rocks exposed are, in ascending order, first a coarse-grained, light-coloured sandstone of undetermined thickness, the upper portion only being visible, composed chiefly from the detritus of granite rocks. On the top of this and separated therefrom by a fine shaley parting, are 4 feet of sandstone, solid, fine-grained and light coloured, without bedding lines or cleavage. On this lie 24 inches of shale, hard but unaltered, and showing marked bedding lines. Over this again there are from 6 to 8 feet of fine-grained sandstone, in layers of from $\frac{1}{8}$ inch to 1 inch thick, showing no foreign substance in the partings but readily separable, as noted. All these sedimentaries lie perfectly conformable and of even thickness, dipping to the south at an angle of 9° from the horizontal. On the top of these strata there is a blanket, 150 to 200 feet thick, of a hard, porphyritic, volcanic rock, massive for the lower 2 feet, but above this taking on a columnar, basalitic structure, the columns being usually five-sided, easily detachable, and rising, each distinctly separate, as a perpendicular mass for 150 feet to the summit of the hill. It would seem from this that the disintegration of the granites of the district had largely formed the "sandstones," etc.; and that, subsequent to their deposition, the whole vicinity had been overflowed by a mass of igneous rock, which has since been eroded away in many parts of the country but is still often found on the higher elevations as a cap to the hills.

Hydraulic Mining.

About 5 or 6 miles up from the mouth of the creek and near where the trail to McKinney crosses it, there has been, for the past few years, considerable activity in placer prospecting for hydraulic propositions.

Several partnerships have secured leases of ground for this purpose, but, though encouraging results have been obtained, no output of gold has yet been made. The most important of these enterprises is conducted by Messrs. Robert Wood, Fred. Keffer and others, of Greenwood, who have constructed a dam across the stream, behind which the water accumulates. Large gates are then opened and the water rushes down the creek, sluicing away the dirt.

Mr. Wood informs me that the output last summer was only a few hundred dollars, but he expects, from the experience gained, to be able to do better next year and is hopeful of success.

Camp McKinney.

Camp McKinney is within 7 miles to the east of the summit of the divide between the drainage areas of the Kettle river and the Okanagan and is, consequently, in the Kettle River Mining Division. The camp owes its origin to the success of the *Cariboo-McKinney* mine, which has a dividend to its credit of nearly half a million dollars, and a number of other properties have since been located and equipped on the same and on parallel quartz leads in the immediate vicinity.

McKinney, as the little town about the mines is called, is on the stage road from Midway to Fairview, and there the stage stops over night. The town consists of some five or six hotels, three or four general stores, drug store, butcher shop, church, school, etc., a telephone office with connection to Greenwood, besides a number of private houses and the buildings of the *Cariboo* mine, the nucleus of the place. There is also located here a sub-office of the Mining Recording Office of the Kettle River Mining Division, in charge of a Deputy Mining Recorder.

Cariboo Mine.

The Cariboo-McKinney Mining and Milling Co., Ltd., of Toronto, Secretary, F. W. Thompson, 34, Yonge street, Toronto; General Superintendent, J. P. Keane; Local Manager and Superintendent, Mr. Betts, is the most important and, in fact, the only successfully working mine in the camp, and it is to it that the place owes its very existence The company owns the *Okanagan*, *Saw Tooth*, *Amelia*, *Cariboo*, *Alice*, *Emma* and *Maple Leaf* mineral claims, all adjoining. The actual workings are at present confined to the four first mentioned and extend along the lead for from 1,700 to 2,000 feet, attaining a maximum depth of 560 feet, although the main lead and others are traced beyond the properties each way by numerous open cuts, pits, etc.

The formation of this locality is chiefly composed of highly altered argillaceous and quartzose rocks, alternating with those of a fine-grain and igneous origin, chiefly diabase, the whole having a general north and south trend. There are shown in the various workings to be at least two important veins cutting across the formation about E. and W., and having a dip to the south at an angle varying from 80° to 95°, while a cross-vein running about N. E. and S. W. passes through the camp.

The only one of these leads which has, so far, been worked to a profit is that upon which the Cariboo-McKinney mine workings are. This is a quartz vein of rather variable width, sometimes as much as 12 or 14 feet, but averaging about four feet.

The vein is evidently continuous with depth, and is traceable throughout the camp by its outcroppings. The workings have demonstrated that it is also subject to a series of faults, which continue to the lowest levels and almost always throw the lead more or less to the south, accompanied with a crushed zone in which values do not occur. This faulting is also accompanied with two or more lines of breaking or slipping to the east, the whole being extremely complicated, yet having sufficient regularity to enable the management to estimate with much exactness where to find the vein again when it is cut off, as very frequently occurs.

The quartz is usually a bluish white colour and is mineralised with iron sulphides, zinc blende, galena, etc., in small bands, with free gold disseminated throughout, and which is frequently visible, more particularly where the quartz is whiter and the mineralisation sparse. The values are not uniform throughout, but run in pay chutes, which seem to dip in the lead to the east. This property has been in operation about seven years, during which time a considerable amount has been paid in dividends, amounting to date to $459,337.52. The old workings were from the outcrop and consisted of shallow shafts and a tunnel; more recent work has, however, been more systematic, and a central, vertical hoisting shaft is now down to the 4th level, a depth of 357 feet.

From this 4th level, at a point some 600 feet east of the shaft, a winze has been sunk 200 feet, with a 5th level 400 feet long at 100 feet, and two small intermediate levels at 50 and 150 feet respectively. The 6th level had not been started, but preparations for so doing were being made. This winze is operated by a compressed air hoisting plant, the ore being hoisted in buckets and dumped into a bin on the level. The mine plans are kept well up to date and are complete. The following dimensions are taken from copies of such kindly furnished by the management :—

Tunnel	level	scales	640	feet long.
1st	"	"	320	"
2nd	"	"	950	"
3rd	"	"	1,400	"
4th	"	"	1,530	"
4½	"	"	175	"
5th	"	"	410	"

In addition to this there are innumerable cross-cuts, winzes, etc., rendered necessary by the complicated character of the vein, and the various raises connecting the levels provide an efficient system of ventilation. The work at present seems to be chiefly on and below the 4th level, it being understood that above that point most of the first-class ore has been removed, leaving, however, a considerable tonnage of second-class ore, which will be mined when the stamping facilities are increased, as is now contemplated.

Hoisting Plant. The plant at the hoisting shaft comprises a 60 h.p. double-geared friction hoist of the Union Iron Works pattern; 2 return flue tubular boilers, wood-fired and of 50 and 60 horse-power respectively, together with heaters, pumps, etc. These same boilers supply steam to a 10-drill Rand air compressor, which operates the hoist at the winze and also the air drills. The cage is a Risdon safety, carrying one car which holds about one ton of ore.

The average output of the mine for the last two years has been about 16,000 tons per annum, having a gross recovered value of about $150,000, or between $9 and $10 per ton.

There were about 60 men employed underground, two shifts of 8 hours being run in the mine generally and three in the winze.

The ore is loaded in a car in the mine from chutes, and is then hoisted to the surface and trammed about 360 feet to an ore-receiving bin, into which it is dumped. From here it is again filled into a car and trammed over a covered trestle for 400 feet to the stamp-mill, where it is dumped over a grizzly and broken by a crusher, falling into bins behind the stamps, into which latter it is fed by automatic feeders.

Stamp-mill.—The stamp-mill, old and not very well housed or equipped, seems efficient and economical. It consists of four 5-stamp batteries :—weight of stamps, 850 lbs.; 98 drops per minute of from 5½ to 7 inches in the order 1, 5, 2, 4, 3 ; discharge, 5½ to 6½ inches through a No. 6 or 7 diagonal slot screen. Of the values recovered, about 86 % are caught on the plates, and 14 % recovered in concentrates, of which three tons are saved for each 100 tons of ore stamped. The discharge from the plates passes through mercury traps and to settling tanks, from whence it is fed to two Johnstone and one Whitley concentrating tables.

The tailings from the tables run out and are impounded by two dams, some 20,000 tons, which are reported to contain values to the extent of from $2.50 to $4 per ton, and to average about $3, being now stored up in this manner. It is proposed to put in a cyanide outfit to save this present loss, a number of experiments having been made which indicate a fair margin of profit for such an auxiliary plant.

The motive power for the mill is supplied from a 12 by 30 Corliss engine and two boilers, of which one only was in use at the time. The whole mine and equipment is far from being a "show property," but the total absence of all frills and a general sense of "utility first and last" gives one the key to the success which has attended the operations of this company.

Sailor Consolidated.

The Sailor Consolidated Mining & Milling Co., of Toronto; president, Jas. Chaplin; secretary, J. J. Frich, of Toronto, with Major A. Megraw as local superintendent and agent, is the result of a combination of the Minniehaha and the Sailor Mining Companies. The claims owned by the company are the *Minniehaha*, *Cariboo Fraction*, *Golden Crown Fraction*, *Sailor*, *Rover*, *Alice Fraction*, *Bellevue*, *Bellevue Fraction*, *Snowshoe*, *Diamond* and *Toledo*, all of which are adjoining. The property was closed down at the time it was visited, and had not been in operation for some time; the workings, too, were full of water and could not be seen.

On the old *Minniehaha* property it is reported that a shaft had been sunk for 200 feet with some 600 feet of drifting at the 100-foot level, and about 150 feet at the 200-foot level on a quartz vein somewhat similar and supposed to be parallel to the *Cariboo* lead and, as seen in an outcrop near the shaft house, from 12 to 24 inches wide. It is questionable, however, whether pay ore has ever been found. Other veins have been exposed on the property, but have only been prospected. There is a well equipped shaft house with a 7 by 12-inch double cylinder hoist, an 80-h. p. boiler with feed pumps, etc., a 5-drill Ingersoll air compressor and 2 sinking pumps. There is also on the property a well equipped stamp mill of two batteries of 5 stamps each; weight of stamps, 1,050 lbs.; one 6-foot Frue vanner and one Whifley table, Blake crusher and a 35-h. p. boiler and engine. The mill was run for three weeks in March, 1900, and everything has been closed down since that time. The ore was received over a trestle from the shaft house, dumped on to a 10-foot grizzly with 1½-inch openings, crushed and fed from the bins to the stamps by two Challenge feeders.

On the former Sailor Company's properties the work has been chiefly confined to the *Sailor* claim and to the development of what is considered to be an extension of the *Cariboo* lead through this and the *Snowshoe*, a contention which seems probable. On the claim referred to a shaft had been sunk, but this was also filled with water. It is reported, however, to be down 175 feet, with levels at depths of 75, 100 and 150 feet. At the 100-foot level 200 feet of drifting was done and the vein is said to average about 4 feet in width, while at the 150-foot level 140 feet of drift was run, the vein here being much broken. The plant consists of a 6 x 8-inch double cylinder Lidgerwood hoist, with 35-horse power boiler and sinking pump, &c.

As far as could be learned from men who had been working in the mine, the vein had been found fairly regular but with little pay ore in it as far as developed. On the surface, in a trench near the shaft-house, the outcrop was exposed and showed from 5 to 6 feet of white quartz from which values of $5 per ton are reported. Near the shaft-house there had evidently been a pocket of quartz which did not appear to be continued in any direction, and from this values of $15 to $30 are said to have been obtained Quite what the association of this mass of quartz had with the main vein was not shown by the development.

Kamloops Mining Claim.

The McKinney-Kamloops Co., President, R. McAuley, of Montreal, owns the *Kamloops* mining claim, lying between the *Sailor* and *Minniehaha* and directly south of the *Cariboo.* On this a shaft, also filled with water, has been sunk for 100 feet and from it about 75 feet of drifting has been done. The hoisting plant consists of a good gallows frame, a 6 x 8 Lidgerwood hoist, a 25-horse power boiler, 1 sinking pump and 1 machine drill, air for which last was piped from the Minniehaha compressor. The property was shut down in March, 1900, and has not been worked since.

There are a number of other properties to the south of the *Cariboo Group*, but on none of these has there been any important work done, and such as has been performed has not disclosed pay ore.

Waterloo.

The Waterloo Milling and Mining Company's mine was not in operation, and as nothing special could be seen it was not inspected. On the west end of the property there is a shaft down 50 feet on a quartz vein, while 300 feet away there is a second shaft down 80 feet, at the 60-foot level of which some 300 feet of drifting had been done. There is a small hoist with vertical boiler, and the company erected in the fall of 1899 a 5-stamp mill, with a Blake crusher and Johnstone concentrator, operated by a 40-horse power boiler and engine—a very complete little plant. The mill is reported to have been run for a month in 1899, returning $2,000, but it has since only been worked spasmodically. The vein is reported to be about 4 feet wide, running E. and W., consisting of a bluish quartz with bands of sulphides, and said to carry fair values in gold, while near the surface free gold is to be seen in the quartz. The property seems to have some merit, and the reason of its abandonment does not appear quite clear.

Lemon.

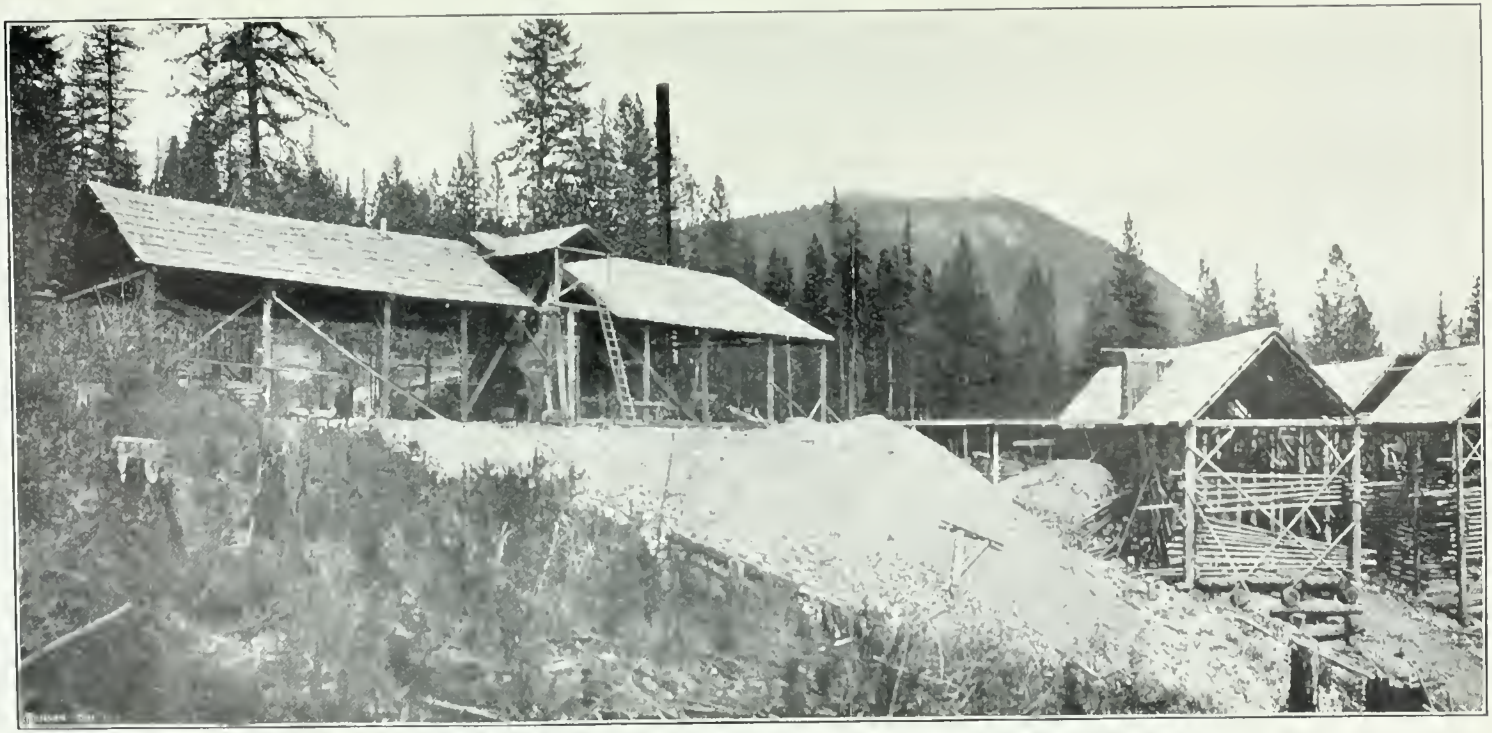
The Lemon Gold Mining Co. owns the *Lemon*, *Pennsylvania*, *Last Chance*, *Gold Standard* and *Galena* mineral claims, situated about 2½ miles east of McKinney. This property was shut down and could not be examined; it is learned, however, that a shaft had been sunk 228 feet, passing under the bed of Rock creek. From the 125-foot level drifts were set off 57 feet to south and 50 feet to north, with a 25-foot cross-cut from the south drift. All the ore which was run through the mill came from this level. At the 210-foot level drifts were run 18 feet to south and 38 feet to north. The plant consists of a 25-horse power boiler and hoist, sinking pump and steam drill. The mill consists of one battery of 5 stamps. The ore is a white quartz, mineralised with iron sulphides.

Victoria Mineral Claim.

The Rock Creek Mines, Limited, a Victoria company, owns the *Queen*, *Victoria*, *California* and *Astor* mineral claims, situated on the right bank of Rock creek, about 4 miles east of McKinney. This was one of the first locations in the camp and the property has been already described in the Report of this Department for 1897, since which time the only additional work done has been to extend the incline downwards from the lower tunnel to a depth of 110 feet. As the property has not been operated since December 1st of the year mentioned, further description seems unnecessary. The mine below the tunnel was filled with water and could not be examined. The timbering in the upraise is covered up in the talcose matter of the lead, which prevented examination higher up. The surface buildings are in good shape, being still in charge of Mr. C. B. Bash, formerly superintendent of the mine.

Night Hawk.

The *Night Hawk* mineral claim, owned by Messrs. Bash & Luce, is situated on the divide or ridge of land between the main Rock creek and the south fork of the same stream. The work done here is entirely superficial, of a prospecting character only, and consists of a number of large open cuts or trenches across the general trend of the mineral-bearing formation. From what development had been done, it would appear that there was a large dyke from 20 to 30 feet wide, with strike N. 50° W. (mag.) dipping slightly to the east and with, apparently, a crushed zone of from a few inches to 2 feet in width lying between the dyke and diabasic country rock. The dyke itself seems to be felsitic in character and is pretty generally mineralised throughout with yellow and white iron sulphides, from which values of from $6 to $14 were said to have been obtained, chiefly in gold with a little silver, although the samples taken at the time as an average did not give nearly as high results. The first open cut was 40 by 10 by 5 feet, while the second was 50 by 5 by from 6 to 10 feet deep.



CARMI MINE, WEST FORK OF KETTLE RIVER.

The *Jim Crow* mineral claim is owned by C. E. Hamilton and is situated on the same divide as the last-mentioned property and about 3,000 feet from Rock creek. A fine-grained basic igneous dyke is here exposed, impregnated with fine particles of magnetic iron and a little copper, but as yet not in such quantity as to be of value. The property was located as a copper claim but occasionally shows gold values. A sample taken from the dyke gave on assay: gold, trace; silver, 1 oz. per ton; and copper, 2.3 %. A shaft had been started which was down some 10 feet and was partly timbered.

Dayton Mineral Claim.

The *Dayton* mineral claim, owned by Hamilton, Younkin *et al.*, is situated on the same divide at an altitude of about 3,900 feet and some 2,800 feet from Rock creek. On the surface there is exposed what appears to be an outcropping of a dyke, originally mineralised with iron sulphides but now largely oxidised. This oxidised material gives good colours of gold in the pan. To strike this surface showing at a depth, a shaft had been sunk 45 feet with a 10-foot cross-cut therefrom, but it failed to find ore for the reason that the dyke was evidently faulted. The latter appears to have a strike about S.E. and is faulted to S.W., the dip being uncertain but probably to S.W. An open cut 60 to 80 feet long, 8 to 12 feet deep and 6 feet wide, exposed what appeared to be dyke matter very much shattered and altered, showing bands of iron oxide running high in free gold, while in the bottom of the cut there was a band of from 24 to 36 inches wide, of undetermined length, highly charged with iron sulphide and running high in gold. A sample from the bottom of the cut gave, upon assay, $14.20 in gold and .5 oz. in silver to the ton. The development work done has certainly shown that the property has much promise but is not sufficient to prove anything more.

The *Le Roi* and *War Eagle* mineral claims were located respectively by Jas. Copeland and Wm. Younkin as adjoining properties, and it was agreed that the work should be done on the dividing lines, so that for all practical purposes they must be considered as a grouping. They are situated at an altitude of 3,850 feet and some 2,800 feet from Rock creek, to the S. E. of the *Dayton*. A large open pit about 15 feet deep had been sunk, from the bottom of which an incline, dipping at about 35°, had been run for 36 feet, and from the bottom of this again a short drift had been made. Both the incline and drift were filled with water and could not be examined.

In the bottom of the shaft there were several large irregular masses of pyrrhotite, mixed with dyke matter, showing evidence of shattering and movement, the whole forming a flat, mineralised zone, which apparently dipped under the water with the incline. There was considerable mineral in sight, but the mode of its occurrence or its extent was not shown by the work visible. On the dump there was a large pile of pyrrhotite and mineralised dyke matter, from which a sample was taken for assay and gave about 1 % copper, 1 oz. silver, and a trace of gold.

OSOYOOS MINING DIVISION.

July 31st.—Camp was broken and a start made from McKinney at 8 a. m., following the waggon road to where it crosses the Okanagan river, about two miles east of Fairview. This point was reached at 4.30 p. m. and camp was then made on the west bank of the river, the distance travelled being about 25 miles.

The Summit, the dividing line between the Kettle River and Osoyoos Mining Divisions, is reached on the road referred to at about 7½ miles out from McKinney and at an altitude of 4,750 feet. It is a low, flat divide, with numerous small, rounded peaks, heavily covered with wash and timbered with small black pine. The Okanagan slope of this range opens out into a series of bunch-grass hills and park land, sparsely timbered with fir of good size and affording excellent grazing ground for cattle. About half-way down the slope there are a couple of farms under cultivation, raising first-rate hay and grain crops. On one of these ranches strawberries of very good quality are grown for the market, coming in about a month later than those produced in the valley below.

As the level of the Okanagan valley is reached the trees disappear completely, the hillsides being studded with sage brush and cactus, while rattlesnakes are not unknown, indicating a dry, hot summer season such as would be expected only in a much more southerly country. The change in scenery from the scrubby black pine of the east slope and summit, typical of an extremely cold northern climate, to the dry, parched, sage brush and cactus-covered foot-hills, is most impressive and indicates how great is the variation occurring in the series of valleys which go to make up the Province.

The Okanagan is probably the lowest of the series of valleys referred to, being at an elevation of about 1,000 feet above the sea. The soil is light but deep, and is capable, with irrigation, of growing almost anything, as may be seen in those isolated patches where any attempt at cultivation has been made. The land is at present only used as a spring and autumn range for cattle, the grass being quite dried up and burnt in the summer, except in the river bottom.

In these mountains, which, as already mentioned, form the divide between the Kettle River and Osoyoos Mining Divisions, there is a feature to be noted which seems characteristic of all the ranges in the Province, namely, that the eastern slope is gradual enough to permit of a railway being taken up anywhere, while the western slope is much steeper, the drop, in this particular instance, from an elevation of 4,750 feet to 1,500 feet, being made in a distance of about 10 miles by the waggon road and about five miles in a direct line.

FAIRVIEW CAMP.

This camp was described in detail in the Report of this Department for 1897, since which time no new features have developed and comparatively little work has been done. There is here a greater showing of gold-bearing quartz than is known in any other part of the Province, but whether or not the gold values are sufficient to permit of profitable treatment is a question which still remains to be settled.

Stemwinder.

The only work of any importance going on in the camp was on the *Stemwinder*, which is now held by the New Fairview Corporation, a reconstruction of the Fairview Corporation. This company is understood to have bought, at nominal figures, the abandoned mills of the *Tinhorn*, *Joe Dandy* and other claims, and preparations were being made, at the time the camp was visited, to establish these near the mine, with the object of treating the ore on a larger scale than previously attempted. It is since reported in the press that 76 stamps are being so installed upon the property, under the supervision of Mr. C. Ostenberg.

The mine is considerably developed, being opened up to the third level on the south vein. The lead is from seven to nine feet wide at the first level, where 195 feet of drifting has been done to the west. At the second level the vein is as wide as 20 feet, with 480 feet of drifting to the west and 360 to the east, while at the third level drifting has been done of 125 feet to the west and 35 feet to the east. In addition to this, a north vein has been cross-cut to and has been found to be about seven feet wide at the first and second levels. The cross-cut from the third level failed to find this north vein, although now past a point where it should have been encountered if dipping as it did in the upper two levels.

The quartz, as exposed in the workings, is typical of the camp—white, dull and much broken by little seams parallel with the walls, forming lines along which the visible mineralisation of iron sulphides occurs.

The veins start at the surface with a dip of 49°, but between the second and third levels the south vein takes a much steeper pitch. The inclined shaft, which had started down on the lead, had not followed this change in dip but had been kept straight, so that at the second level a cross-cut of 16 feet had to be made to the lead, and at the third level a cross-cut of 84 feet. It is quite apparent from the work done that the vein holds its dimensions well with depth and that the question of the quantity of ore available has been satisfactorily proved in this mine, a fact which may safely be conceded as true of most of the properties in the camp.

The quartz is very easily mined, and, with the natural facilities existing, should be delivered to the mill at a very low mining cost. It is, however, seriously questioned whether there is a sufficient water supply for the working of 76 stamps at the present location of the mill.

The most important question, however, is that of values recoverable from the ore by treatment. The property has been repeatedly sampled by the owners, who report that such samples yielded, on assay, values of from $4 to $7 per ton. An independent sampling, said to have been made by Mr. Taylor, gave $4.36 per ton as assay value. The sampling and assays of the management indicate that the lowest level is nearly $1 better than the upper levels, but it must be again pointed out that hand sampling of a property of this description cannot but be unreliable and the only method worth anything is the treatment of a considerable tonnage in the mill. It is, however, reported that some 500 tons of ore from the workings were sent to the *Smuggler* mill and were run through, making a 75% saving on an assay value of $5.50 per ton.

The assay values claimed for the best claims in the camp are about $5 per ton, and whether the amount which can be saved from this sum will render these propositions profitable remains to be seen; it certainly has not proved to be the case in any property in the camp so far.

Morning Star.

Among the properties noted in the Report of 1897 is the *Morning Star*, which is still held by the same owners, Messrs. Mangett and McEachern, of Fairview, and is probably on the *Stemwinder* vein, or another equally as large. Nothing new can now be added to the report made at the time mentioned.

The company owning the *Joe Dandy* erected a 20-stamp mill on the Okanagan river, just above the bridge, and it is reported that about 500 tons of ore were milled, but no reliable information could be obtained of the yield recovered. It is inferred, however, that it was not satisfactory, as the property is now abandoned and the plant has been bought by the *Stemwinder* company.

The *Tin Horn* has, likewise, been abandoned, and the mill from this property has also been acquired by the *Stemwinder*. The shutting down of this mine is undoubtedly due to the lack of values in the quartz.

The company owning the *Smuggler* erected a full 10-stamp mill with 3 Frue vanners, built by the Jenckes Machine Company, of Sherbrooke, Quebec, at a cost of $21,000, and which was used to run through about 100 tons of ore from this claim, and about 500 tons of ore from the *Stemwinder* as a trial. The mine and mill, however, are now abandoned.

The *Silver Crown*, reported as now owned by Messrs. Hammond and Bluett, was also closed down, and nothing new can be reported about the property.

The Strathyre Company, president, Duncan McIntyre, Montreal, has done no work of any account since the last report, and is abandoned at present. This company owns the *Rattler*, *Ontario Fraction*, *Brown Bear*, *Wynn M.* and *Wide West* mineral claims.

Flora.

On the *Flora* a considerable amount of work has been done, consisting of a 610-foot tunnel with a 300-foot cross-cut, exposing a fairly regular vein, running east and west, from 7 to 9 feet wide, in which the values are said to have been found very variable, from $5 to $7 being claimed as an average. The workings are on or near a contact of schist and granite. The property has not been worked for some time.

The *Western Hill* and *Virginia* are adjoining claims on the same lead, but comparatively little work has been done on them.

August 6th. Camp at the *Stemwinder*, to which point a move had been made from the valley on the 3rd inst., in order to avoid the heat and mosquitoes, was broken at 8 a. m., the pack train being sent to Olalla or Keremeos by waggon road, and the saddle horses taken across country to the north, striking the Fairview-Penticton road some five miles out from Fairview. This road was followed north to White lake, so-called from the alkaline deposit on its shores.

Coal at White Lake.

To the east of this lake, above a short stretch of hillside, the mountains rise precipitously for 600 feet, and appear from the exposures, as seen with a powerful glass, to be chiefly sandstone or fine-grained conglomerate. To the west the country slopes very gradually towards the lake, which lies in the lowest point of a basin or wide draw between the hills lying to the north and south. This draw is devoid of trees, the surface soil being a fine clay. On the southern slope several small outcroppings of coal-bearing rock were noted. About three-quarters of a mile to the west of the main road there has been an attempt made to mine coal. Exactly what the workings amounted to could not be learned, but, judging from the dump, they were not very extensive. A circular shaft, about 4½ feet inside diameter, had been sunk, but was then filled with water and could not be inspected, and the depth is unknown. The dump would, however, indicate that it was not over 40 feet.

No coal of any size was found on the dump, but the small fragments discovered showed it to be a lignitic coal of fair quality. In the dry bed of a small gulch cut in the clay, some 200 feet from the pit, the outcroppings of the seam were found. The section here showing is, in ascending series, first, beds of unknown thickness consisting of conglomerate of alternating fine and coarse layers composed of disintegrated granite and other igneous rocks, including small boulders of granite up to two cubic feet in size, but with no sign of any fragments of rocks of original sedimentary derivation. On the top of these lay a finer-grained conglomerate, still made up of granite particles and occasionally containing pieces of petrified wood, the replacement of the wood being by silica. Above this, again, came shale in bands alternating with coal, but in no instance was the coal found to be more than a few inches thick, while the clay partings were of an equal width. These beds were traced up the gulch for 100 yards, the strike of the measures being about S. 65° W. (magnetic), and the dip at the outcrop about 18° S. 25° E.

The coal and shale beds appear to be about 10 feet thick, and are overlayed by bituminous shales and slates. What may have been exposed in the shaft is not known, but there is certainly no workable coal shown in any of the outcroppings which could be found.

From White lake a road leading to the upper end of Keremeos creek was taken and followed down to the townsite of Olalla, where the camp and the pack-train were found at about 9 p. m., the distance travelled being about 25 miles.

Bullion.

The *Bullion* mineral claim is one of the claims in the neighbourhood of Olalla held by the Keremeos Mining Syndicate, the manager of which is Mr. Morris. The property is situated to the east of and directly above the

Olalla townsite, at an altitude of 3,200 feet, or about 2,000 feet above the level of the valley. The country rock here is a fine-grained igneous variety, which seems to be considerably altered along a joint plane, and, in the immediate neighbourhood of the ore body, is granular, having the appearance of a garnetite, in places showing well-defined crystals of garnet. The mineralisation appears to have occurred along a belt or zone, in which the alteration referred to is most apparent and which runs about N. and S., with a dip nearly vertical. On the surface this mineralised belt is indicated by a considerable iron cap, below which sulphides of iron and copper are apparent, associated with crystals of magnetite and garnet.

The development work done consists of various surface strippings, the most important of which was about 50 feet square, along the face of the bluff, where some blasting has been done. A slip joint in the country rock comes to the surface here, and is supposed to form one boundary of the mineralised belt.

Some 400 feet to the S. E. of this exposure a tunnel had been started, and was then in about 15 feet, in addition to some 10 feet of open cut preceding it. This tunnel is in a fine-grained, igneous rock, which appears to be generally mineralised more or less as indicated, but with patches of copper pyrites extending over a width of two or three feet. In this width the copper pyrites were estimated as forming about 5 % of the whole, which would represent a copper assay value of about from 1.5 to 2 %. The manager reported that no gold or silver values of importance had been obtained, which seemed to be confirmed by subsequent assays.

The work done exhibited an extensive mineralisation but failed to discover a sufficient concentration of values to entitle the property to be classed as workable in the absence of gold and silver values. The claim has been worked from Olalla, and no buildings have been erected in connection with the property.

Opulence.

The *Opulence* mineral claim, owned by the same syndicate, is situated near the summit of the hill directly to the east of Keremeos post-office. It is approached by a trail ascending from Richter's, up the flank of the hill. The claim is at an altitude of 4,200 feet, on a grass-covered knoll through which the rock crops out in places, appearing to be a dark-coloured hornblendic variety, probably considerably altered and impregnated with iron and copper sulphides.

The surface rock presents the appearance of having been cintered, looking like a black, iron slag, and is probably an altered hornblende, in which occurs a certain amount of copper oxide and probably some silicate of copper. Selected samples of this material, showing pronounced mineralisation, were taken for assay and gave 10.9 % copper and 1 oz. silver. The claim is supposed to contain native copper, but no samples could be found carrying such.

The principal work done on the property consists of a couple of shafts. The deepest of these was reported to be down 45 feet, with a 15-foot drift to the south at 20 feet depth, while the other shaft was down about 30 feet. These workings were partly filled with water and, consequently, could not be inspected, but, judging from the dump and from report, the shaft had continued down for some 30 feet through the surface rock with its oxidised ores, and had here struck into what appeared to be a diorite impregnated with sulphides of copper.

On the *Eldorado* mineral claim, a continuation down the hill, somewhat similar mineralisation was observable, but not seemingly quite so strong.

On the *Surprise* mineral claim, also held by the Keremeos Mining Syndicate, a tunnel had been driven in for some 110 feet, showing a lead from 2 ft. to 2 ft. 6 in. wide with an ore streak from 4 to 8 inches, reported as carrying good values in gold.

On the *Searchlight* a 45-ft. tunnel followed in a dyke of hornblendic material impregnated with small quantities of copper pyrites.

On the *Magdala* mineral claim, situated on the mountain above Richter's and owned by R. W. Northey *et al.*, an open pit some 10 feet deep shows the diorite country rock to be mineralised with pyrrhotite and a little copper, while the weathering of the face white denoted the presence of considerable arsenical pyrites. The work done did not show what the deposit might be, nor enough of its occurrence to form an opinion as to its origin or probable value. A sample of the pyrrhotite taken for assay gave only traces of gold and silver and ½ % of copper.

Flagstaff Mineral Claim.

This claim, also owned by the Keremeos Mining Syndicate, lies above and adjoining the *Searchlight*. There appears to be here a zone in the country rock, of which no limiting boundaries could be noted, but which was observed over a width of from 100 to 200 feet, and consisted of hornblende, black mica, and a cementing material of a light green colour, probably felsitic. This zone has a trend N. W. and S. E. In certain places the hornblende seemed to be replaced by magnetite, which occasionally occurred in solid masses, showing in places evidences of copper.

This zone was noted at an elevation of 2,700 feet, and at 2,900, or 200 feet higher up the hill, a tunnel had been driven easterly for 15 feet into the hillside at the base of a steep rocky bluff. A carefully taken average sample from the sides, roof and face of this tunnel, which was supposed to be in the ore body, failed to give upon assay any values in gold, silver or copper, while an average sample of the ore pile on the dump gave on assay ¾ % copper and traces of gold and silver.

August 9th.—Camp was broken at Olalla at 8 a. m., the pack train following up Keremeos creek for about three miles, when a trail (since made into a waggon road) was taken, running up a narrow gorge, but with an easy grade and connecting with the Nickel Plate waggon road from Penticton at Twin lake. This latter road was then followed for three or four miles and camp made in the valley between Green and Dividend mountains.

August 10th.—Dividend mountain, as it is locally called, and its continuing range westward rise abruptly from the Nickel Plate waggon road to the south-east, reaching an altitude of 7,500 feet. At the very summit of this range and dipping to the E. a bed of impure limestone outcrops at the top and on the face of an almost perpendicular cliff 1,000 feet high. On the outcrop of this limestone a number of claims have been recently staked, only one of which was then being worked, and none of which had sufficient development done to show what might be expected below the surface.

Apex Group.

The most important of these properties, certainly as far as development goes, is the *Apex Group*, owned by McMillan *et al.*, and consisting of the *Keystone*, *Australian*, *Alpha*, *Apex* and *Standard* mineral claims. Here there have been several small surface cuts made, showing in fissures in the limestone a replacement of the lime by pyrites, arsenical pyrites and chalcopyrite, which certainly gives considerable promise for the amount of work done. A picked sample of the ore herein exposed was taken for assay and gave 7.7 % copper, $12 in gold and 2.8 oz. in silver per ton.

Dividend Group.

This group consists of the following six mineral claims, which are adjoining, viz., *Dividend*, *Dividend Nos. 1*, *2* and *3*, *Juno* and *Diana*, and is held by the Keremeos Mining Syndicate. The property is situated on the summit of Dividend mountain and extends down the east slope of the hill for some distance The country rock here is, generally speaking, a fine-grained igneous variety, probably a diorite and would appear from the indications found on the previously mentioned claims to be in all likelihood underlaid, at no great depth, by a band of limestone, although such could not be found on the property. Much of the surface of this group is covered, under a light surface wash with an iron capping which is seemingly the result of oxidisation of pyrrhotite, the extent of which has not been determined. The development consists of the West workings, where a pit, 6 to 8 feet deep, has been sunk, in which. along a slip in the country rock, there is apparently a replacement lead about 6 feet wide, striking S. W. and dipping 60° to west. The lead matter consists of garnet rock, fine-grained and coarse and associated with fairly solid pyrrhotite and white iron, the garnets, in places, being perfect crystals of $\frac{3}{4}$ of an inch in diameter. In another place on this part of the claim an open cut 30 feet by 8 feet by 2 to 3 feet deep has been made, exposing a mass of the same class of mineral. In this cut a 6 by 8-foot shaft had been sunk for about 10 feet and had cut through the surface deposit of mineral and into the diorite country rock. The distance between these two openings is about 150 feet and the surface between them indicates the mineral as shown in each to be continuous, but it has not been broken into at any point.

Some 500 feet distant from these prospect holes a pit has been sunk for 18 feet. This, at the surface, was in pyrrhotite, said by the management to have assayed $4 per ton, gradually passing into bands of quartz carrying copper pyrites. The bottom of the shaft appeared to be in the diorite country rock, here mineralised with copper pyrites. The showing of mineralisation on the surface is certainly very large, but the fact of its not being overlaid by rock, coupled with the fact that two shafts cut through it in a very short distance, leads to the belief that the deposit is, here at least, an over-flow surface sheet, the origin of which has still to be found. A sample of the pyrrhotite taken for assay did not show any values of commercial importance.

Green Mountain Group.

Green mountain is the name locally given to the hill lying to the north-west of the Nickel Plate waggon road at this point and is a grass-covered and timbered slope extending back for a couple of miles, in which distance it gains an elevation of about 1,500 feet above the creek. Starting from the creek in a westerly direction there is a contact of a lime band with a diorite. At this contact there occurs a crushed zone, in which there is a series of lenzes of pyrrhotite, associated with a little chalcopyrite. Following this so-called "lime dyke," the *Green Mountain Group*, now owned by James Black *et al.*, has been staked out and consists of the following connecting mineral claims, starting at the creek, viz., *Connection*, *Alfred*, *Black*, *Green Mountain*, *Recruit* and *Native*, of which the *Alfred*, *Black* and *Green Mountain* are said to be Crown-granted. The work done has been confined chiefly to these three Crown-granted claims.

On the *Black*, at an elevation of 5,600 feet, a tunnel has been driven N. 40° W. for 72 feet. Three hundred feet in elevation higher up the hill, on the *Green Mountain*, a tunnel 125 feet long had been run in, with the evident hope of striking a large surface showing of pyrrhotite exposed in a 25-foot open cut some 40 feet higher up the hill. Such ore body was not struck in the tunnel which was run in the country rock, the only sign of mineralisation therein being a stringer of calcite a few inches wide, carrying pyrrhotite, white iron and yellow copper. It would appear as though the first-mentioned showing was also an overflow surface deposit of pyrrhotite. A similar surface showing of pyrrhotite occurs 125 feet further up the hill and again at the summit, where it has been stripped for a width of 25 feet, and here shows a greater amount of copper than elsewhere.

Mr. Black reports his assays to run from $1 to $1.50 in gold and $1 in silver per ton, with 1 to 2 % copper. This assay in copper may be obtained on the upper workings but was not visible as an average lower down, where the bulk of the mineralisation is pyrrhotite, which was sampled and assayed, giving traces only in precious metals and very little copper.

Beaconsfield Group.

On the range of hills to the left of the Nickel Plate waggon road, a continuation of the range on which was found the *Dividend* and *Apex Groups*, and near the summit of the divide where the road crosses, is the

Beaconsfield Group, consisting of the *Beaconsfield*, *Guinevive* and *Gibraltar* mineral claims, locally known as Northey's claims, and owned by the Keremeos Copper Mines, Ltd., of Keremeos, B.C. The mine cabins are situated on the road side, here at an elevation of 6,450 feet.

The two first-mentioned claims abut on the road, extending up the hill, and the *Gibraltar* adjoins them higher up, a short trail leading from the cabins to the workings. On the *Beaconsfield* there is exposed, on the steep hillside, a considerable surface showing of pyrrhotite, with a little chalcopyrite. At an elevation of 6,825 feet a tunnel was driven into this showing, but in the course of a few feet cut through it into the country rock, probably a diorite, which is here impregnated with iron and copper sulphides. At 35 feet in the tunnel was still in this class of rock.

On the *Gibraltar*, at an elevation of 7,150 feet, about two days' work only has been done in excavating a pit 4 feet deep, which showed the somewhat broken country rock, heavily impregnated with iron sulphides, in places passing into almost solid pyrrhotite, with a little chalcopyrite.

A sample of the pyrrhotite taken for assay gave no appreciable values in gold or silver, and less than 1 per cent. in copper.

These claims had scarcely been prospected and, although the work done had not developed any ore value, still the mineralisation was such as to amply justify further work.

Riordan Mountain.

Directly across the waggon road from the last-mentioned claims is Riordan mountain, an abrupt, dome-shaped hill, rather than a range. On this there have been a number of locations made, but on few of them has there been work enough done to justify mention. The *Billy Goat Group* is the only property with work done to any amount. This group consists of the *Billy Goat* and *Shamrock* mineral claims, owned jointly by J. Riordan and the Keremeos Mining Syndicate, and of the *Afterthought*, owned by J. Riordan.

The development work has been done on the east slope of the mountain at an elevation of 6,900 feet, and consists of a large open cut, in some 20 feet, which shows a large body of pyrrhotite and some copper pyrites associated with garnetite, apparently in a crushed zone in the country rock, which latter was probably originally a diorite but is now somewhat altered.

Above this showing a number of smaller open cuts and surface exposures were noted, the highest being at 7,150 feet elevation, and all showing the same class of mineral.

The sample of the pyrrhotite taken for assay gave no gold and small values in silver and copper. All over this hill there are showings of pyrrhotite, many of which are evidently only surface deposits, but it is more than probable that some will be proved to be more permanent. The hill has the general appearance of having been a separate, small volcanic peak, and it is probable the source of the mineralisation will be discovered, although the development so far done does not satisfy one that it has as yet been uncovered.

20-MILE CREEK CAMP.

August 12th.—Camp at Green mountain was broken and the pack train sent on to the *Nickel Plate* mine, a distance of 8 miles by the waggon road, the Provincial Mineralogist stopping at Riordan mountain and following on later to where camp had been made on the *Triangle Fraction*. Riordan mountain is about the summit of the divide, the waters to the westward of this height flowing through various creeks directly into the Similkameen river and away from Keremeos creek. The waggon road to the westward of Riordan mountain follows, at an elevation of between 5,000 and 6,000 feet, the high plateau and slopes occurring near the summit of the range lying to the north of the valley of the Similkameen.

There have been a number of claims recently staked to the north of this stretch of road. These were not being worked at the time, however, and, as their location could not be found, there being no defined trails, and as they were reported as having little or no development done on them, they were not visited.

August 13th.—Nickel Plate mountain lies toward the head and on the east watershed of 20-Mile creek, reaching an altitude of about 7,000 feet. The whole of the mountain has been pretty well covered with mineral locations, on comparatively few of which has work to any amount been done, and, with a few notable exceptions, their value is supposed to lie in their proximity to the *Nickel Plate* mine. The camp may be put down as a gold camp, for, although some copper is found, the chief value lies in the gold, which seems to be associated with arseno-pyrites, and does not here appear to be found to any extent with the iron pyrites in the absence of arsenic.

Nickel Plate Mine.

This property was located in September, 1898 by Messrs. Wollaston & Arundell. It was somewhat developed by them, and was afterwards sold to M. K. Rodgers, who represents a Montana syndicate This is the most important property on the mountain, and in fact gives its name thereto. The rock formation of the mountain, from a hasty examination, appears to be composed of very highly altered sedimentaries, interspersed with planes of igneous rocks—andesites, etc., which are so exposed as to produce the appearance of being bedded. It would appear as though on this property the ore body consisted of a highly silicified band or bed, now so much altered that its original character is obscured.

The ore-bearing body on which the discovery was originally made outcrops on the face of the hill at an altitude of 6,300 feet, striking nearly horizontally along the hillside and dipping into it at an angle of about 17°. It has a total width of about 40 feet, overlying a bed or sheet of apparently igneous rock, the mineralisation being strongest near such contact.

The mineralisation, which, to a certain extent, is disseminated throughout the ore-bearing body, is much more pronounced along lines of fissure in the body, and naturally varies in amount along such lines, so much so as to render sampling of the mine very indefinite. The mineralisation consists of iron pyrites with a considerable proportion of arseno-pyrite, with which latter the high assay values obtained in this mine are associated. From selected samples assays, of considerably over $100 per ton in gold have been obtained, but the ore as mined will not run nearly so high, probably not much over $20 per ton.

Development.

This property has been developed by tunnels entirely, the configuration of the hill rendering such the best method, since, approximately, two feet of tunnel gain one foot in depth. The main or No. 3 tunnel, as it is called, starts at an elevation of 6,150 feet, and runs to the south-west directly into the hill for a distance of 428 feet. It is in the country rock, not having struck the ore body as yet. In this, at a point 353 feet from the mouth, there is a raise of 90 feet to No. 1 drift. This latter drift extends 25 feet to north-west, not showing ore in this direction. It has also been driven south for 250 feet with a branch from it to west of 120 feet, and a secondary branch from this to south of 50 feet. From this main drift raises have been made to the No. 1 tunnel and from here to the surface, which is at about 185 feet vertically above the main tunnel. This is at present the productive portion of the mine. The sum total of workings amounted to about 858 feet.

For the past three years active development work has been continuously carried on with a force of about 20 men. No ore has been shipped nor has any been taken from the property, but such as has been broken in the process of development has been stored in the mine ready for shipment or treatment when the proper facilities are afforded. Consequently no authentic data are available as to just what the ore as mined will run, but, as before stated, it is estimated in the neighbourhood of $20 per ton. A sample taken, representing roughly the assorted ore, gave on assay $56.80 in gold, 1.96 oz. in silver per ton and 2 % copper, while another sample taken of the lower grade ore gave $8.80 in gold.

In addition to the work underground the management has made a number of open cuts and short exploratory tunnels elsewhere on the property. The results of this work could not be obtained in the absence of Mr. Rogers. An office, store, bunk houses, mess house, stables and several houses have been erected on the property, and a small power plant has been installed in the valley below the mine. The company has, at its own expense, surveyed and built a road from the mine to Penticton, on Okanagan lake, from which point all supplies are taken to the property. It is understood that a part of the cost of such survey and road has been refunded to the company by the Government.

The *Sunnysides* mineral claim is also held by M. K. Rodgers. On this, as exposed in a 20-foot open cut and a 15-foot tunnel following therefrom, there is a well-defined contact of a crystalline limestone with a fine-grained igneous rock, the line of contact dipping at about 20° to north-west. On this contact mineral has been deposited, chiefly iron and arsenical pyrites. The tunnel cross-cuts the contact and runs on for 15 feet into igneous rock. No attempt, however, has, so far, been made to follow the contact, and the value of the property is not demonstrated further than as described. The amount of mineral proved is unimportant and the values low.

The *Bull Dog* mineral claim, held by M. K. Rodgers, is also situated on the north slope of Nickel Plate mountain, at an elevation of 5,900 feet. At the contact of a crystalline limestone and the igneous country rock, here forming the bulk of the hill, there appears to have been some crushing and much alteration in a zone in which there has been deposited, chiefly in the lime, a band of iron sulphides, pyrrhotite with occasionally some chalcopyrite and pyrite, but little arseno-pyrite, and associated therewith considerable garnetite was noted, probably an alteration of the lime. These sulphides are, at the surface, much oxidised, leaving an iron oxide from which free gold can be obtained by panning.

The development is very unsatisfactory, as the mineralisation is apparently extensive, but has not been proved by the work done, which consists of a 25-foot tunnel and 3 or 4 open cuts, showing the "pay streak" to be from 18 to 24 inches wide.

The assay value claimed as an average was about $10 per ton, but as obtained from samples taken at the face it was considerably less. The mineralisation in places appears to be 200 or 300 feet wide and to extend that distance from the limestone.

Horsefly Mineral Claim.

This claim lies on the south slope of the mountain and to the S. E. of the *Nickel Plate;* it is owned by Mr. F. Wollaston, P. L. S. On this property the work done is so scattered and the developments are so contradictory that no theory as to formation could be formed. In No. 1 open cut, which is about 5 feet deep, a band of limestone is shown, apparently in place, on the top of which is lying a banded quartzose rock, similar to that found overlying the ore body on the *Nickel Plate.* One hundred feet below this, in an open cut about 30 feet long and in places 10 to 15 feet deep, there appears to be a crushed zone, 4 to 5 feet wide, in a banded, flinty country rock such as noted above the limestone. This zone shows extensive mineralisation. Overlying this zone is a sheet of from 12 to 20 inches of fairly solid sulphides, chiefly a granular white iron, very similar to that in the *Nickel Plate,* and which is associated there with the high values found.

In the third open cut, a small excavation on what is called the "middle lead," at the contact of the banded quartzose rock and a crystalline limestone, there is a contact deposit of from 8 to 12 inches of iron sulphides, much oxidised here on the surface. This oxidised matter gives "colours" in the pan. Some distance further down the South or 20-Mile creek slope, in a small gulch, are two open cuts, the first of which only shows a fine-grained, igneous rock, containing hornblende crystals, in contact with a coarse-grained, hard rock, probably a garnetite or altered, impure limestone.

In the second cut there is a capping of garnetite, shading off gradually into a highly silicified lime rock and showing underneath in the cut a considerable amount of oxidised iron, &c., said to carry values in gold.

As before noted, the values in this camp seem to be directly associated with the white arsenical iron rather than with the pyrite or pyrrhotite, and on this property this white iron is considerablly in evidence. There seems to be a good deal of mineral on the property, but as yet the development has been insufficient to indicate either the nature of the deposit or the quantity of ore to be found. No assay values could be obtained, but it is reported that they are satisfactory. The property is only a prospect but it must be admitted that it is well worthy of serious development and has considerable promise.

Red Mountain Group.

This property is situated at an elevation of 5,200 feet on Red mountain, which is a northward extension of the Nickel Plate mountain, and comprises the *Red Mountain*, *Florence*, *Homestake* and *Spokane* claims, owned by J. Brodhagen and J. Murphy. The ore body consists of a mineralised zone in a fine-grained, igneous rock of undefined width, but traceable nearly all across the property. The mineralization consists of arseno and iron pyrites, and the assay value, as reported on an average sample, was $4.80 per ton.

Snowflake Group.

This group is situated on Nickel Plate mountain, to the north of the *Nickel Plate* mine, and consists of the *Gold Man*, *Mountain View*, *Snowflake*, *Tip Top Fraction*, *Mother Lode*, *Humming Bird* and *Lookout* mineral claims, located in 1900 and owned by J. J. Marks. The ore is arseno-pyrite and iron pyrites, disseminated through a fine-grained, igneous rock, the boundaries of such impregnation being undefined. The values are reported on an average sample as from $3 to $4 in gold. The work done consists of an open cut 33 feet long and averaging about 3 feet deep, but attaining a depth of 10 feet in places.

The *Golden Zone Group* is situated on the north fork of 20-Mile creek, about 8 miles from the mouth and is owned by J. J. Marks. This group was not personally examined, but was reported as consisting of the *Silver Bell* and *Golden Zone*, *B. C.* and *Irish Boy*. The country rock is slate, cut by igneous dykes, which latter are mineralised and said to carry fair gold values. The ore occurs in quartz leads which cut the dykes, and are about 4 feet wide, having an east and west strike and vertical dip, as exposed by open cuts and a small draw for some 50 feet. The mineralisation consists of arseno, copper and iron pyrites and blende, the values being in gold and reported as running from $10 to $20.

The *Marquis*, owned by D. Legget, adjoins the *Irish Boy*, and is reported as having exposed three quartz ledges from 1 to 3 feet wide, carrying copper sulphides.

I. X. L. Group.

The *I. X. L. Group* is situated on the south-west or 20-Mile creek slope of Nickel Plate mountain, at an elevation of 5,700 feet, the mountain dropping off on this side almost precipitously for nearly 2,000 feet. This property is owned by H. W. Yates and George Cahill and includes the following claims, extending from near the summit to the bottom of the hill, viz.: *I. X. L.*, *Climax*, *Copper Chief* and *Czar*. On the *I. X. L.* there has been very little work done other than surface cuts, etc., and it is not of such a character as to determine definitely the mode of occurrence or origin of the ore body, but such indications as could be found pointed to a contact between a garnetite and a light-coloured porphyritic rock, along which there was a crushed and mineralised zone some 10 to 12 feet wide, dipping vertically and with a north and south strike. In a surface cut, at an elevation of 5,500 feet, there was exposed in this zone a band of from 4 to 6 feet of oxidised material, the whitish colour of which indicated the presence of a considerable proportion of oxidised arseno-pyrite. In a second cut, at an elevation of 5,700 feet, the same country rocks were visible, apparently in place, but much broken and possibly slipped, in which there were numerous stringers of red oxide of iron, which showed gold in the pan and were said to assay well in this metal. The whole vicinity was so disturbed and irregular that no indication could be obtained as to the nature or extent of the deposit.

The *Climax* mineral claim lies next below the *I. X. L.* and extends over a 400-foot bluff into a narrow draw, access to which could only be obtained by ropes or ladders, and it was not personally inspected. It was learned from one of the owners that a 30-inch seam of iron oxide had been found 175 feet down the cliff, on which a tunnel had been run in for 60 feet, and it was claimed that the first 40 feet of such seam gave assay values of $17 per ton in gold. The last 20 feet are also said to have been on the lead, but the assay value is not known.

The *Exchange Fraction*, owned by C. H. Arundell, is located on the summit, at an altitude of 6,300 feet, and on this very little work has been done as yet. A pit 20 feet by 10 feet and some 5 feet deep had exposed a sheet of mineralised country rock, somewhat similar in character to that of the preceding property, and apparently dipping to the west at an angle of 30°.

The ore was chiefly pyrrhotite, and assays were reported of 2 % copper and some gold, but the development was too slight to form any idea as to the probable value of the find.

Copper Cliff.

The *Copper Cliff* is situated on the western slope of Nickel Plate mountain, at an elevation of 6,100 feet, and is owned by Johnson, Jacobson and Williams. Here, near the centre line of the claim and towards the north end, at the base of a 200-foot bluff, there had been discovered a large outcropping of pyrrhotite and copper pyrites. Into the face of this an open side cut, 15 feet wide and 15 feet into the hill, had been made, and from this cut a tunnel had been started, then in about 10 feet. As far as this work had gone, it was in almost solid mineral all the way, the mineral lying in bedded layers parallel with the slope of the hill, *i. e.*, about 45°. These layers are each only a few inches thick and vary somewhat in composition, the upper showing more copper pyrites and the lower more pyrrhotite. A sample taken as representing this exposure gave copper 1.6 %, gold $2.40, and silver 2.8 oz. per ton. There is certainly here a fine large exposure of mineral, and the work done so far has been satisfactory, but it has yet to be demonstrated whether the ore body is in place, or whether it is a secondary deposit on the surface only.

Kingston Mineral Claim.

The *Kingston* mineral claim is situated on the Twenty-mile creek slope of Nickel Plate mountain, at an elevation of 3,950 feet, and about half-way down on the trail from the Nickel Plate mine to the valley of the Similkameen, at the mouth of Twenty-mile creek. A small gulch has been cut in the side of the mountain by a stream flowing due west, which is practically dry in summer except for certain subterranean springs which come to the surface in its bed. On the south side of this gulch there is a secondary ridge, following it up, and on this ridge there is a very large surface exposure of mineral. This mineral is found in layers parallel with the face of the hill at this point, and curving with the present configuration of the ridge. This deposit is very similar to that found on the previously mentioned claim, the layers being quite distinct and the ore, when broken, parting freely on the bedding planes. The upper layers in this case also carry proportionately more copper.

On this showing a tunnel had been driven, starting off nearly at right angles with the bedding of the mineral, but immediately curving to the left, so that in the length attained, some 47 feet, it had curved nearly 90°, forming a quarter-circle, the last part of which was parallel with the bedding of the mineral. The first part of this tunnel had been entirely in mineral, but in the last 15 feet it was in mineral on the left-hand side and not on the right, apparently indicating a deposit from 20 feet to 25 feet thick, the tunnel in the last part being parallel with and on the inside boundary of the mineral. A few feet in, a cross-cut of about 10 feet, which was in nearly solid mineral, had been set off to the left. A sample taken, which was an approximate average of the mineral as exposed in the tunnel, gave 5.7 % copper, $9.60 in gold, and 2.6 oz. in silver per ton. The property had just been surveyed, and it is understood a Crown grant has been applied for.

It has since been credibly reported that some 500 feet up the hill a second and stronger showing of mineral has been struck, upon which some work has been done with satisfactory results, but this showing could not be found at the time, as there was no one working on the property to indicate its position. There is here undoubtedly a considerable body of mineral, and the property has much promise. It is, however, probable that the exposure at the tunnel is an overflow from the main ore body, which has yet to be developed.

August 15th.—Camp at the *Nickel Plate* was left at 8 a. m., and a move made by trail to Sterling creek, arriving there at 3 p. m. and stopping on the way at Hedley to purchase such supplies as could be obtained. From the *Nickel Plate* the trail leads southward along the summit of the plateau for about a mile, when it begins a tortuous descent, taking about four miles to go down a distance of some 3,500 feet, and following the Twenty-mile creek slope In a straight line the hill makes this drop in about one mile, so that, although Hedley is only about two miles from the mine in a straight line, a waggon road, if such is built, would have to be at least 10 miles long, and could not get up Twenty-mile creek but would probably follow up Eighteen-mile creek, which is less precipitous.

Sterling creek is a small and rapid stream which flows into the Similkameen from the south, about four miles above Hedley, rising in the Ashnola range of mountains, which form the southern boundary of drainage area of the Similkameen river. The valley of the main river is here about one mile wide and is flat; the soil is gravelly and poor, with little timber, and it is mostly covered by Indian reserves, although a few ranches have been taken up by whites on the south side of the river.

Golden Canyon.

The *Golden Canyon* mineral claim is situated on the right or east bank of Sterling creek, about three miles from the mouth, a rather "blind" and difficult trail leading along the west bank to the camp, just across the creek from the claim. The property is owned by Hackney, Barnes *et al.* The east bank of the creek at the claim rises at an angle of about 45°, and on this steep face there have been exposed several blanket quartz veins, dipping into the hill at 45° and out-cropping nearly horizontally along its face with a strike north and south.

The first or lower lead is from 12 to 24 inches wide, and is, in places, very porous, while in others it is solid white quartz and seems, as exposed in a shallow stripping, to have mixed up in it a certain amount of fine white kaolin, while it is mineralised here and there, very irregularly, with arseno-pyrite, pyrrhotite and some pyrite, not as yet showing values of commercial importance.

The second lead is about 30 feet higher up the hill. Here there was a 15-foot open cut, followed by a 10-foot tunnel, driven through surface wash to within two feet of the face, where it cuts a band of quartz similar to the first mentioned and displaying the same class of mineralisation, but on this lead, as encountered, there has been no development done.

Some 100 feet still further up the hill there is a third band of quartz, developed by a small open cut and a 6-foot pit, which show three to four feet of crushed quartzose matter, through which are scattered small bands of mineral similar to the other leads, while along what is apparently the foot-wall there is from 8 to 10 inches of fairly solid mineral. The lead here is much broken on the surface and its continuity is not proved. Some mineral is shown to exist here, but the development is entirely too slight and superficial to be of any value in determining the future of the property.

Maple Leaf.

On the south side of the Similkameen river, some two miles below Sterling creek, a small, nameless creek, or rather gulch, comes in, and on this, about a mile up, is situated the *Maple Leaf* mineral claim, or, as it is locally known, "H. C. Pollock's claim." There are two leads exposed on the property. On the first or small lead, an open cut 8 feet long, 3 feet wide, and 4 feet deep (about two days work) shows the out-cropping of what appeared to be an overturned and much broken quartz vein. This out-cropping can be traced nearly horizontally for about 200 feet. On the same vein there is a 15-foot tunnel in broken lead matter, not in place, although there is apparently quartz in place in the lower side of the face of the tunnel, but the work had been stopped before this had been proved. The work done was insufficient to show the dip, strike, or character of the vein with any certainty, but it seemed to be the crushed out-cropping of a flat lead dipping into the river. Mr. Pollock claimed for the quartz an average value of from $3 to $5.

About 40 feet above the small lead is the *Big Lead*, which is developed only by open cuts and stripping, showing a jumbled mass of crushed quartz from 15 feet to 20 feet across, probably the broken over out-crop of a quartz lead, but giving no indication as to value, although on what looked like a hanging-wall there was a small stringer of solid iron sulphide ore some 12 inches wide. The values claimed for this were about $10, while selected samples of the clear mineral are said to have assayed as high as $34 in gold.

A second open cut (14 feet by 6 feet by 3 feet), apparently on this same vein, shows a more solid lead dipping into the hill at an angle of 45°, but of undetermined width. This had been sampled and is reported as running $10 in gold to the ton.

SIMILKAMEEN MINING DIVISION.

August 17th.—Camp at Sterling creek was broken at 4:30 a. m. and a move made to Allison, on the Similkameen river, opposite Graveyard creek, a distance of 19 miles by waggon road, arriving here at 2 p. m. The Provincial Mineralogist went on three miles further to Princeton, for mail and necessary supplies, here meeting the Minister of Mines, Mr. McBride, and reporting to him verbally.

From Hedley to a point about three miles below Allison, the valley of the Similkameen is from one to two miles wide, with fine stretches of bottom land and some splendid ranch property, much of which is now settled upon by Indians and half-breeds. The valley is well timbered, and the hills, although rising abruptly, have fine grazing ground on the benches, which in summer, however, are very dry and burned up on the lower levels, the cattle ranging well back into the hills during this part of the season.

At the point mentioned, three miles east of Allison, the steep hills pinch in and the valley becomes little more than a canyon. The hills on either side are so rugged as to confine all future roads, whether rail or waggon, to this canyon.

After passing the canyon the valley again opens out wide for six or seven miles, as far as Princeton, a town which is situated in the forks of the Similkameen and Tulameen rivers. Here is afforded some very good bottom land, suitable for agricultural purposes, while the surrounding hills are covered with bunch-grass, making an excellent cattle range.

This valley is at a considerably higher elevation than the Okanagan, being about 2,000 feet above the sea according to barometrical readings, though it must be noted that the bench mark of a recent railway survey was found showing the elevation as only 1,560 feet. However, as barometric elevations have been used throughout this report, they are best for relative heights if not for absolute measurements.

August 18th, Sunday.—This was an idle day, the pack-train needing rest as well as the party generally. The Minister of Mines visited the camp in the afternoon and the further programme for the summer was arranged.

August 19th.—Camp was moved to the east side of the Similkameen river, at Bar. Hall's ranch, 4 miles above Princeton, a stop of six or eight hours having to be made at the latter place to have all the horses re-shod.

August 20th.—A move was made to Copper mountain, following up the Deeks trail on the west or river side of the mountain, a distance of 10 miles, arriving there shortly after noon, As the season was very dry, no water could be discovered after some hours' search, till finally a prospector, Ed. Burr, was found on his claim and directed the party to a small spring, only yielding sufficient to water one or two horses at a time and leaving washing out of the question.

August 21st. Arrangements were made with a local prospector, Robert Cramer, to act as guide over the various properties on Copper and Kennedy mountains.

Sunset Mine.

The *Sunset* mine is by far the best known and most developed property in this district, and is owned by the Sunset Mining Co., with office at Grand Forks. The property, when visited, was shut down and had not been worked during the season, owing, it was reported, to disagreement among the owners. The plant was in charge of a Chinese cook, from whom no information could be obtained. The rock formation of the mountain is made up of highly altered and metamorphosed sedimentaries, much broken and cut up and replaced by comparatively recent igneous rocks, chiefly dykes, felsitic and porphyritic in character. The mineralisation apparently occurs in mineralised zones in these felsitic dykes, and seems to have some relation to the porphyritic dykes, just in what way is not clear, but not necessarily in the contact.

From the work done it was impossible to determine definitely the relative age or sequence of these igneous rocks, but, from such indications as could be found, it would seem as though the first or oldest is a light-coloured granite, followed by the porphyrys, and the felsites coming last. It must be admitted, however, that the evidences of this are far from conclusive.

In the felsitic dykes, if dykes they are and not very highly metamorphosed sedimentaries, the mineral seems disseminated through the mass of the rock in small flakes, as though an original constituent of the rock segregated out by cooling and not the result of infiltration. No connection seems to exist between the separate particles of ore and the mineralisation seems to be more or less uniform through the zones In this mine and in several of the adjoining properties the mineralisation is by small flakes of bornite, while in other localities it is by yellow copper.

On the *Sunset*, *Vancouver*, *Helen Gardner*, etc., the ore zone seems to be parallel and in contact with a large porphyry dyke, as far as could be determined from the surface.

On the *Sunset* the shaft starts in the felsitic matter, about 100 feet from this porphyry dyke and, as the shaft dips at a flatter angle than the dyke, it will, if produced, eventually cut it.

Development.

The chief work of development is an inclined shaft which dips at an angle of 60° to the N. E. and which was reported as being down 190 feet, but as it was filled with water to within 75 feet of the surface, this and further description of the underground workings were gathered from local miners. From this shaft, at the 100-foot level, a drift had been run to the south for 50 feet and to the north for 25 feet. At the 150-foot level drifting had been done for 85 feet to the south and 25 feet to the north. This latter drift is reported to have just cut into the porphyry dyke which was noted on the surface as dipping at a greater angle than the shaft, and is now being approached by the shaft, and should be cut by it at about 200 feet depth.

Plant.

The hoisting plant consists of a gallows frame and rough-board engine house in which—seen through the windows only, as it was locked—were a small, upright boiler and a friction hoist capable of hoisting from a depth of 200 to 300 feet; also a ventilating fan, pumps, etc. The ore is hoisted from the mine in a skip-bucket and dumped over a bin into an iron mine-car, and thence taken to the dump. The underground arrangement could not be learned. Judging of the underground workings from the dump, it would appear that they had all been in rock of pretty uniform character, which is all classed as ore. A large sample was taken of the whole ore dump, and afterwards broken down; this gave on assay 2 % copper, with 40 cents in gold. Selected or sorted samples of the ore will undoubtedly go as high as 5 or 8 % copper, but from what could be seen on the property the ore as mined will not run much over 2½ to 3 %.

The *Tinhorn Fraction*, owned by Ed. Burr, lies between the *Sunset* and *Helen Gardner* and has exactly the same ore as on the *Sunset*.

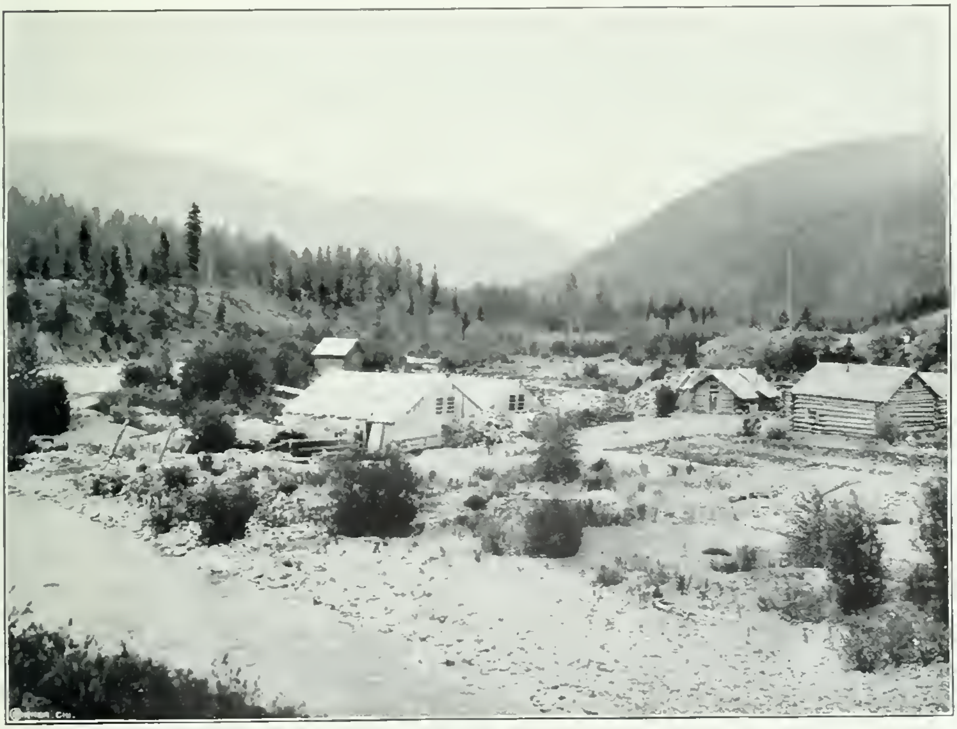
The *Mabel Fraction*, also owned by Ed. Burr, lies on the other side of the *Helen Gardner*.

The *Triangle Fraction*, situated on Copper mountain above Deeks trail and lying between the *Princess May* and *Copper King*, is owned by Thomas Bros., of Princeton.

Development consists of a 15-foot tunnel from an open cut 30 feet long, showing up a clear and well-defined lead, strike N. 60° E., of about 18 inches in width, with a gouge on the side and well mineralised with copper pyrites. This mineralisation is continued into the gouge and also into the enclosing rocks. The vein is apparently a fissure mineralised by infiltration from neighbouring rocks. A sample taken of the assorted ore gave on assay 5.7% copper, with only a trace of gold or silver. The development work done is not sufficient to give an indication as to the value of the property.

The *Princess May* adjoins the preceding claim and is owned by Chas. Powell, of Princeton or Grand Forks. A dyke from 6 to 8 feet wide, enclosed by fairly defined slip walls, is heavily mineralised throughout, chiefly with copper as chalcopyrite. On this an open cut has been run for 30 to 40 feet and about 5 feet deep. An average sample taken across this lead gave 3.5 % copper and 40 cents per ton in gold. Some 25 feet from the just-mentioned exposure, and 12 to 15 feet from the apparent line of such dyke, there is a pit 15 feet deep, in what appears to be the same dyke matter and which is similarly mineralised though to a slightly less degree, probably indicating parallel mineralised zones in the same rock. An independent sampling of the dump from this second opening gave 3 % copper.

TULAMEEN VALLEY.



HYDRAULIC PLANT, GRANITE CREEK.

The *Red Eagle* is owned by Thomas Bros., of Princeton. An open cut, 40 feet long by 5 feet deep, exposes a mineralised dyke or mineral impregnated zone in country rock, similar in character to the last claim, although not showing as much mineral, probably not over 1½ % copper on the average, though there is a streak, from 18 to 20 inches wide, showing in the cut, which runs higher, say from 2 to 2½ % copper, with little or no values in precious metals. A second cut shows a fissure with a silicification of the mineralised rock matter and, along the fissure, mica and magnetite.

Ada B.

The *Ada B.* mineral claim, in the same camp, is owned by Robert Cramer *et al.* A series of open cuts show an impregnated zone some 60 feet wide in an igneous felsitic rock, carrying generally throughout it yellow copper in small amounts but not in paying quantity, say from 1 to 1½ % copper. A shaft had been sunk on this and was down 15 feet, showing a band in the rock about 24 inches wide, in which the impregnation was very much greater, running about 3 % copper. The values in the upper 10 feet of the shaft are low, but certainly appear greater in the bottom.

Some 200 feet further down the hill an open cut, 10 to 12 feet deep by 6 feet wide, has been made, showing on one side—following a fissure—gouge matter of possibly 12 inches in width, which was said to carry gold, but which was not sampled. The enclosing rocks were also impregnated with copper as far as could be seen, the fissure being probably a secondary deposit. The claim certainly has considerable promise, but the development is entirely too superficial to prove anything.

The *Centre Star Fraction*, having the same owners as the last claim, lies between the *Transvaal* and *Annie L.* There is here a pit 15 x 20 feet, with a 10-foot open cut from it, showing up a mineralised belt in country rock, here very much broken. There is a fair amount of mineralisation of the rock matter with copper pyrites, but the work done had not reached solid formation. No gold values are reported.

The *Annie L.*, owned by Pat Kennedy, lies next to the *Princess Maud.* Some work has been done and a fair showing of copper is made. On this claim there is an open cut 30 feet x 10 feet deep, showing up a band in the rock, 12 inches to 18 inches wide, which was judged to run about 3 to 4 % copper, although the remainder of the cut only showed copper in small seams.

Helen Gardner.

The *Helen Gardner* mineral claim lies at an elevation of 4,500 feet to the south-east of and adjoining the *Tinhorn Fraction*, and is owned by Chas. Saunders, Miller *et al.* This may be considered as an extension of the *Sunset* claim, as the conditions are the same.

The main shaft was said to be down 50 feet, but was full of water and could not be examined. The ore on the dump presented the same appearance as that at the *Sunset.* A little to the north of the shaft is an outcropping showing an iron cap of magnetic iron with some copper sulphide through it. A second shaft to the N. E. of the main shaft was also found to be full of water, but was reported as down 45 feet. The ore on the dump here was similar to that from other openings in this zone, viz., yellow copper and bornite, but the texture of the rock matter was somewhat coarser.

The *Oriole* mineral claim lies to the south-east of the last-mentioned, and is owned by Snowdon Bros., of Princeton. On this claim a shaft was down about 30 feet, but also had water in it and could not be inspected. The ore on the dump was similar to that of the preceding claims, with possibly a greater proportion of yellow copper and less bornite, the grade being about the same. The rock matter was also lighter in colour, a fact which was noted in all the rocks as they approached the granite area.

The *Jennie Silkman*, owned by French and Day, lies still further to the south-east, but was not personally visited. The work done consists of a 22-foot shaft and an open cut 100 feet x 4 feet x 4 feet. The ore is practically the same as the rest, though small quantities of copper glance were noted in it and gold and silver values are reported as slightly better.

The *Humboldt* mineral claim is owned by Geo. Wolf, of Grand Forks. This property lies in the granite area already noted, and has a shaft down 35 feet, but as there was no means of getting down or up it the inspection had to be made from the surface. The last work done here was in 1898.

As seen from the surface there appeared to be a true quartz vein, from 3 to 3½ feet wide, striking N. 70° E. The vein matter is quartz carrying iron pyrites and a little copper, with a considerable percentage of crystalline calcite, which seemed to act as a cementing material in the lead. The copper contents are low, and any values the ore may have would be in gold, carried by the iron pyrites.

Sunrise Mineral Claim.

The *Sunrise* mineral claim lies west of and adjoining the *Sunset*, and is owned by Ed. Burr *et al.* The work done is about 400 feet from the boundary of the *Sunset*, and consists of a shaft, down 35 feet, which was timbered and partly filled with water. Besides the shaft there are two or three open cuts. In a general way the property is similar to the *Sunset*, although the ore-bearing rock is somewhat different in appearance. It is here a dark-coloured, close-grained rock, apparently of igneous origin and showing grains of black mica and whitish feldspar, while the mineralisation is a yellow copper and bornite. The ore is reported as running from 2 to 3 % copper and up to $1 in gold. No samples of it were taken.

This and the other claims are certainly very low grade as smelting propositions and it is feared could not be concentrated by any of the processes of water concentration owing to the very fine division of the ore particles. The claim was to be Crown-granted in the fall of 1901.

The *Copper Farm* mineral claim is owned by Saunders and Miller and is reported as Crown-granted. Here an inclined shaft has been sunk, dipping at 80° to N. 10° E., which passes through a fine-grained igneous rock, probably a diabase, very sparsely impregnated with copper sulphides at this point, where there is supposed to be a barren zone.

Copper Bluff and Copper Cliff.

These claims are situated on the right bank of the river, about a mile above the ford, where the trail from Copper mountain to Kennedy mountain crosses the Similkameen. Parallel with the river and a short distance from it is a large vertical exposure of a fine-grained rock of mottled appearance and seemingly composed of feldspar with mica or hornblende, but no visible quartz. This rock has been somewhat shattered and along the seams almost pure pink feldspar has been deposited. In one of these fissures, some 6 to 8 feet wide and about 200 feet above the river, which has been filled with feldspar, bunches of bornite have been found. These bunches are of variable size and irregular occurrence, producing most beautiful specimens, many of which were discovered on the dump, but no ore, in the commercial sense, could be found in place. On the *Copper Cliff*, about 35 feet above the water, a tunnel had been driven in for 20 feet, following a feldspar-filled seam from 2 to 6 feet wide, which is said to have contained bunches of good ore, although at the time the property was visited there was no ore in place.

KENNEDY MOUNTAIN.

August 22nd.—Camp was broken early and all was ready for a move, but some of the horses having strayed, owing to scarcity of water, the day was lost.

On *August 23rd* the move was made from Copper mountain, the trail descending a very steep hillside to the river, the bed of which was followed down for some distance until a possible landing place was found on the west bank. The bottom of the river is very rough and the current swift, so that this ford is only possible at extremely low water; at other times the trail would have to be taken back to Princeton and a crossing made there.

Kennedy mountain is a name given locally to the range of hills rising abruptly from the west bank of the Similkameen, 8 or 10 miles above Princeton. The river bank rises at an angle of about 35° and is composed largely of iron-stained rocks and the detritus therefrom, in many places showing a red streak down the whole face of the hill. Generally speaking, the rock formation is similar to that of Copper mountain, but there does not seem to be any marked copper zone or band as on the latter.

The *Ingersoll Belle* mineral claim is situated near the top of the hill, on the plateau of Kennedy mountain, and is owned by Hugh Kennedy *et al.* The work done is a very poor apology for prospecting, and so far has not amounted to more than scratching of the surface.

On a small knoll two open cuts have been made, 4 feet x 3 feet x 30 feet long, showing the country rock, here heavily impregnated locally with iron, which at the surface weathers to an "iron cap," and which is stained green and blue from copper solutions. In an open cut on the other side of the knoll, some 75 feet away, a side-hill cut has been made in the rock where it comes to the surface above the wash. The formation here is a fine-grained igneous rock, probably a diabase, heavily impregnated with iron and copper pyrites all through, and although it was not feasible to properly sample the exposure, as a very large sample would have been required, it was estimated to carry from $\frac{1}{2}$ to $\frac{3}{4}$ % copper, and is said to contain certain gold values. Sixty feet lower down a tunnel has been driven into the hill for about 10 feet, and has "built up" on the outside for 15 feet, nominally making a "25-foot tunnel."

From the various surface cuts it would appear as though there was here also a mineralised zone, which seems to be about 300 feet across and would appear to strike about N. 60° E., but as the country and the formation was very much broken the surface indications must be taken with some reserve.

The *Constellation Fraction*, having the same owners, is a continuation to the west of the previously mentioned claim, in the same class of formation, while still to the west of this again there is reported to be slate formation, but this was not visited.

The *La Reine* is a surveyed claim held by the Vermillion Forks Mining and Development Company, of Princeton. The work done on this property has been a series of short tunnels, driven in what is evidently not solid formation, as in the face of the lower tunnel, at a depth of 50 feet and in from the mouth 50 feet, there are found growing the tree roots from above. A small stringer of copper pyrites, about 6 inches wide, was cut, and the country rock on either side is mineralised with copper sulphides, but the concentration of values is insufficient to be classified as ore.

The *Mogul* mineral claim is owned by Pete Johnson and Chas. Williamson, and is about 300 feet vertically above the river. Here again the work has not reached solid formation. The first cut visited was 10 x 4 x 6 feet, and was still in grass roots, while the second cut was evidently in slide. The cuts and strippings on the property indicate an impregnation of a zone in the country rock with chalcopyrite, and in places there are great splotches of mineral on the surface, but no continuity of ore is shown. There are strong indications of mineral on the property, but development so far has not revealed any ore body of even probable value.

The *Red Buck* mineral claim adjoins the *Mogul* on the south and is owned by Geo. Allison and C. Revelly. The claim is developed by a series of side-hill cuts, so far in the broken igneous country rock, which may be slide matter. Some 200 feet higher up a tunnel has been driven for some 20 feet into the solid and partly timbered. From such exposures as could be found it would appear as if the rock has fissures and bands running through it in a general N. 30° W. direction, and these bands show varying degrees of mineralisation by copper and iron sulphides, but in no place was mineral seen amounting to any commercial value.

Brooklyn. This is said to be the prior location on the mountain, and is owned by E. Burr, H. Jones and A. E. Howse, of Princeton This claim extends down the steep hillside from nearly the brow of the hill to the river. Down the face of the hill there is evidence of a fissure in which some movement has taken place. How much faulting has resulted is not in evidence, but the line of fissure is distinctly marked by a gouge of whitish talcose matter from 4 inches to 12 inches wide, which seems to dip at about 80° to north and strike about N. 60° E. In this gouge there are kidneys of copper pyrites, while the enclosing country rock is also mineralised with copper. The copper in the gouge is probably a secondary deposit from the leaching of the enclosing rocks. While the kidneys found are comparatively pure mineral, they are, as seen in present openings, not sufficiently large to be profitably mined.

Magnetic. This claim is on the steep hillside facing the river and is owned by H. Jones, of Princeton. There is here a dyke or band of the country rock, striking N. 60° E. and apparently 400 to 500 feet wide, differing somewhat in texture from neighbouring rocks and becoming much lighter in colour on weathering. The whole surface of this dyke is a slide, and so precipitous that it could not be examined in detail without ropes. In the slide are numerous pieces of ore, pyrrhotite, chalcopyrite, etc., evidently brought from somewhere on the hill above, although the location from which they came could not be found. This zone seems to have weathered more than others, and in several places there was evidence of mineral being deposited on the surface by water from the rock. The float found would certainly indicate a deposit, but the broken character of the rock renders it hard to say what may be expected in the solid formation.

The *Gladstone* mineral claim is on Friday creek, a small stream which flows from the west into the Similkameen river, to the south of Kennedy mountain. It is owned by E. P. Wheeler, Conconully, Washington. The claim is situated in the creek bottom, about 1,500 feet from the river. The property was discovered and worked over 10 years ago.

An open cut on the left bank of the creek, and about 35 feet above it, showed some copper sulphide ores in a fissure in rock which is evidently not in place, or at least is very much broken up. Below this a tunnel of 174 feet, with a cross-cut, was driven 10 years ago, timbered and lagged all the way, except for 15 feet from the face, where the said formation begins and where the cross-cut was made.

On the surface and in the open cut there were seen some bunches of beautiful bornite copper ore, but these did not seem to be in very important amount, and no mineralisation was found in the tunnel.

August 24th.—As reports had been brought into Princeton of various rich finds of gold ores in the neighbourhood of Roche river, the Minister of Mines directed that that section be visited; consequently the camp at Kennedy mountain was moved to the upper part of Friday creek, where there was water for the horses, there being only a mud hole at the former place. The Provincial Mineralogist remained behind for a day to inspect further claims, reaching camp at night.

The direct trail up the Similkameen from Princeton branches off the "Hope trail" about four miles up Whipsaw creek, and, proceeding southerly behind the first range of hills, joins the Kennedy mountain trail at Friday creek. The distance from Princeton to Friday creek by this trail is about 20 miles.

August 25th.—Camp was moved from Friday creek to the forks of the Pasayton and Similkameen rivers, a distance of about 18 miles, requiring seven hours' hard travel with a pack-train. The course travelled was due south, following the Similkameen within a few miles. After a journey of about two hours from Friday creek, Sunday creek was crossed, and, after three hours' more travel, Copper creek was reached. These are both small streams, entering the Similkameen from the west. Two hours' further travelling brought the party to the mouth of the Pasayton, a good-sized stream flowing in from the south. Up this latter a branch trail leads, crossing the Boundary about 18 miles above the junction of the river with the Similkameen.

The Similkameen, above the Pasayton forks, has been locally and erroneously called the Roche river, whereas the Roche river flows into the Similkameen from the south, some 12 miles higher up, rising beyond the Boundary. When, therefore, local reference is made to the "Roche River camp," it is intended to designate the section of country around the junction of the Pasayton with the Similkameen.

August 26th was spent examining various claims in this locality. These were found, however, to be merely prospects in the earliest stages of development.

Red Star.

The *Red Star* mineral claim was located in June, 1900, by Bonnevier and Pouwels, and is situated 500 feet up on the north-west slope above the Similkameen river and some two miles above the forks. The country rock here is a light-coloured mica schist, dipping at an angle of about 45° to S. 20° W. On this claim there appears to be a fault plane, having about the same strike as the schists but dipping at an angle of 70°. Along this plane there is crushed schistose material, 3 feet to 5 feet across, through which there is a stringer of quartz a few inches in width on the average, but making bunches here and there. Along the hanging-wall of the slip, which is well defined, there are bunches of yellow copper. The schist, for some little distance from the fissure, is silicified and is impregnated with copper and iron pyrites along its bands. The development consisted of a 25-foot open cut and a 15-foot tunnel therefrom, on the fissure mentioned, but had not as yet exposed ore in any serious quantity.

Some 200 or 300 feet to the south of this exposure and then supposed to be on the same claim, but since reported as being on the *Anaconda* mineral claim, there was found a 10-foot tunnel, driven in on a silicified fissure in the same schists, here locally much stained by iron oxide. Water "making" in the fissure had so disintegrated the schists and talcose matter that the tunnel had caved in and could not be entered. Here again the talcose matter carried a little quartz. Very little copper could be seen but some iron pyrites appeared along the side of the fissure. No values of any importance were found in the samples taken.

The *El Paso* mineral claim is apparently a re-staking by J. B. Wood. In a 15-foot open cut from 0 to 12 feet deep, in a schist dipping 55° to S. 70° W., there was a small inter-bedded seam of white quartz, showing no mineralisation.

The *Sailor Lass* mineral claim, owned by W. G. Ellis and J. B. Wood, extends from an altitude of 4,350 feet at No. 1 post to 4,700 at No. 2 post, but although diligent search was made, no development work of any sort could be found on the claim. The country rock is a hard, compact, white mica schist, dipping to east. This schist is somewhat silicified and shows stringers of quartz throughout, but no mineralisation was seen.

The *Sailor Jack* mineral claim lies below the *Sailor Lass*, and extends down hill for 300 feet vertically. It was located on September 15th, 1899, by Bonnevier and Pouwels. Here there was found a 12-foot pit, showing a quartz ledge in a hard, dark schist. This ledge, at the surface, was about 3 feet wide, but pinched down to about 12 inches, and was devoid of mineralisation.

The *Gold Crown*, owned by Bonnevier and Pouwels, is located on the right bank of the Similkameen and in the fork between this river and the Pasayton. Here a tunnel had been driven in for 70 feet, in which distance it had gained a total depth of 7 feet. The first 50 feet had been through loose surface wash and the remainder through broken or loose rock. The whole tunnel, except the last 6 feet, was timbered. From the tunnel there had been taken a considerable quantity of quartz containing bornite, apparently from a broken ledge, which was not, however, visible in the face of the tunnel. The ore, as assorted on the dump, would run about 2 % copper, reported as containing high values in gold and silver. The work is not in solid formation as yet and cannot be reported on further.

The *Pasayton* mineral claim is located on the left bank of the Similkameen, opposite the forks, and is owned by Hugh Kennedy. The formation is a dark-coloured, close-grained, schistose rock of the same general character as noted above, but here impregnated with cubes of iron pyrites and showing interbedded stringers and lenzes of quartz, which are apparently devoid of mineralisation. Accompanying this quartz is a white, flaky mica, which looks like a metallic sulphide.

On the hill a little surface stripping had been done, and, in a natural cave slightly enlarged and 6 feet deep, quartz stringers were seen in broken slide rock. These stringers were from 2 to 18 inches wide. On the dump there were about two tons of quartz piled up, which were carefully sampled and assayed but gave only a trace in gold. The property was reported as containing "tellurides," and was carefully examined for them, but not a trace of such ore could be found.

August 27th—A move was made up the Similkameen river for 12 miles, to the forks of the Roche river, where camp was pitched for the night. Careful search was made in the neighbourhood for any claims, but no trace could be found of any prospecting having been done in that section, or of its having been even visited by prospectors. The only sign, indeed, of its having been previously visited was the old trail and camping ground of the original boundary survey, which crossed the Ashnola mountains and followed up the Similkameen river. The country here is heavily covered with clay wash, and solid rock was seldom visible, and then did not show any sign of mineral, nor could any float be found in the stream beds.

Roche river enters the Similkameen from the south, about 8 or 10 miles north of the Boundary line, the valley of the Similkameen here running E. and W.

August 28th.—Camp was moved 10 miles further up the Similkameen to where its headwaters occur in two small lakes. There is no stream above ground past this point, although there is undoubtedly one flowing below the heavy gravel which fills the bottom of the valley. This was as far as horses could be taken without cutting a great deal of fallen timber, and the journey was thereafter continued on foot.

August 29th. The valley was further followed up on foot for about 5 or 6 miles to the summit of the watershed between the Similkameen and the Skagit rivers. The valley at the summit is half a mile wide and level, sloping off gradually to the westward from the Pass, the elevation of which was 4,800 feet. The rocks of this section were schists and slates, much broken and weathered, with few, if any, igneous dykes and no visible mineralisation.

On *August 30th* a return was made to the mouth of the Pasayton, a distance of 18 miles.

On *August 31st* the party travelled from the mouth of the Pasayton to Friday creek, a distance of 18 miles; and on *September 1st*, from Friday creek to Princeton, a distance of 20 miles.

On *September 2nd*, "Labour Day," the men and pack-horses rested after a hard three days' return trip of 58 miles over a bad trail. *September 3rd* was spent in examining properties in the neighbourhood of Princeton.

Coal at Princeton. The only coal deposit in this vicinity which, at the date of inspection, had had any serious development work done on it, was situated just across the Similkameen river bridge from Princeton, and was held by the Vermillion Forks Mining Co., of which Mr. W. J. Waterman, C.E., is manager and superintendent. The river here flows nearly north (mag.), and the bank on the east side rises steeply from the water's edge, the stream cutting across the coal measures, which are seen in the face of the bank in section, dipping to the south at an angle of 13°. The face of the bank had not been stripped and was covered with the disintegrated shales, etc., of the measures, so that little could be seen from the surface.

About 50 feet below the bridge mentioned, and 5 or 6 feet above the water level, an adit tunnel had been run in on the strike of the coal almost due east for a total distance of 133 feet. At the end of this main entry a drift had been set off to the left or north, for 27 feet to the rise, following the lay of the bed, while at 107 feet in from the mouth a level drift had been run for 77 feet, cutting into the floor or "foot-wall," and so making a section of the seam, the only place where such could be seen.

The entry tunnel had been made 7 feet high x 5 feet wide, evidently as a prospecting tunnel, and had been run near the upper part of a seam which, from the cross-section obtained in the 77-foot drift, was at least 11 feet 4 inches thick, with some slate partings, the section further showing below this a band of 24 inches of shale, while below this again there had been cut 13 feet 4 inches of coal. The floor had not been reached, and how much coal there may be still lower could not be determined.

Just above the bridge a tunnel had been driven in on a seam exposed there, but this had been covered by a waggon road recently built and no record of its history could be obtained. From its position, however, this second tunnel must either have been in an overlying seam or in the upper part of the seam cut in the main tunnel. In the bed of the river, opposite the tunnel, coal could be seen, and from its position would appear to be below the coal in the tunnel. Unfortunately, Mr. Waterman was absent and no record could be obtained of the exploratory work done, nor could maps, etc., of the field be had. It is, therefore, probable that there is much more coal than has been noted, although these beds, if proved to exist undisturbed over any considerable area, are quite sufficient to assure a considerable output. Small coal seams were noted for a couple of miles up the river, quite undeveloped but proving the coal-bearing measures to extend for some distance.

On the west side of the Tulameen river, opposite Princeton, coal is found in the bank. As the tunnels had caved in it could not be examined, but it proves that the valleys of the Similkameen and Tulameen have been at one time a coal basin. That this basin extends up the Similkameen has been proved by the recent development of coal beds at Ashnola, 4 or 5 miles above Princeton. The details of these developments are not available at present, nor have they proceeded far enough to show conclusively the charater of the coal measures struck.

The active search for coal in this section did not begin until 1901, and at the time the district was visited few results had been obtained. Since then, however, much prospecting has been done with the diamond drill and in other ways, and coal is reported over a large area of this district. The results of this work are not available for this year's report, and must be taken as pointing out the existence of the coal rather than giving any idea of the amount.

Character of the Coal.—On the Vermillion Forks Mining Company's area the coal, as seen at the surface, is naturally broken and very much stained with clay, etc., on the seams, but in the inner parts of the tunnel, under a cover of about 100 feet, it is firm and clear, frequently breaking with a conchoidal fracture, is of a dark, black, rather resinous appearance and a low specific gravity.

In the tunnel, near the face, a sample was cut from the rib from top to bottom, across about 8 feet of coal, free from large shale bands, but with occasional small ones included. This might be said to be a fairly average sample of the coal as it would be mined, and not a picked sample by any means. It gave on analysis—

Moisture	11.97 %
Volatile combustible matter	30.49 ″
Fixed carbon	49.21 ″
Ash	8.33 ″
	100.00 %

Ratio of volatile matter to fixed carbon, 1 : 1.61.

By fast coking this sample yielded a non-coherent coke and a reddish gray ash, looking like fine sand. A strict reading of the above analysis would class the coal as a lignite, to adopt the classification of Mr. G. C. Hoffmann, Chemist of the Geological Survey, in the Report of 1882-84, but taking into consideration the fact that this sample is from an absolute cut across the seam and contains some bands of clay, while in a sample of the pure coal the ash and moisture would be lower, and also considering the other analyses obtained in the district, it is propable that it should be classed as "lignitic coal," or an intermediate between lignite and true bituminous coal. The coal from the face does not seem to disintegrate after a year's exposure to air, does not soil the fingers, makes a good domestic fuel and is used for blacksmithing.

September 4th.—A move was made from Princeton to the town of Granite Creek, a distance of 12 miles by a good waggon road which follows up the valley of the Tulameen river, camp being made below the town in pouring rain.

GRANITE CREEK.

September 5th.—Granite creek was, in the early days, the scene of extensive placer operations, but at the present time all the available placer ground appears to have been worked out, and only a few Chinese are now to be found along the stream. While the "old channel" appears to have followed the general course of the present creek at certain points, this old bed is covered with heavy gravel wash, from 100 to 150 feet thick, and in several of these spots hydraulic operations have been begun, although work was not being carried on at this date. The gold of Granite creek has been found to carry with it appreciable amounts of platinum, which was at least partly saved with the gold, although it is suspected that the larger part of it was lost.

Granite Creek Hydraulic Co.

The most extensive operations on the creek have been carried on by the Granite Creek Hydraulic Co. (head office, Ottawa; Christy & Green, agents). Two pits, about 200 by 100 feet by 50 feet deep, have been washed out on the left bank of the creek. The plant consists of two monitors with 3-inch nozzles, supplied with water through a 12-inch pipe, under a head of 85 feet, although by the use of a little more pipe a further head of 130 feet could be had from the same flume, which is of ample size and in good repair. The pits do not seem to have been operated in a manner to get the greatest results out of a given amount of water, but rather with a view of immediate returns. What these returns were it was impossible to find out, as there was no representative of the company on the ground, but it is understood that operating expenses were covered.

Just below the workings referred to, the "old channel" is supposed to have cut through a draw to the left and to have originally emptied into the Tulameen about half a mile above the present mouth, and while there is no proof of such, the theory certainly seems probable. This supposed channel is filled with gravel wash and is, it is understood, held by the same company. It does not, however, appear to have been systematically tested, so that its value is unknown.

Just above these workings Col. Stevenson, an old-time "placer man" on this creek, though handicapped by lack of proper plant, is intermittently working, but with what success is not known.

Boston and B. C. Mining Co.

This company, with headquarters in Boston, Mass., has been operating a plant at the mouth of Granite creek, where the "old channel" is supposed to be covered with the wash, but has, as yet, not accomplished anything. The company is working with a process patented by a Mr. Coleman, of 39, Cortlandt street, New York. This process has been described fully in a recent issue of the "Engineering and Mining Journal," of New York.

A shaft, 20 feet square and well timbered, had been sunk for 39 feet, from the bottom of which a further shaft, 10 feet by 12 feet, had been put down for 43½ feet without striking bed-rock. Some difficulty with in-flowing water had been encountered, although one 8-inch and two 4-inch centrifugal pumps were on hand, together with a 60 horse-power locomotive boiler. The dirt from the shaft was hoisted out by a Lidgerwood engine and crane, and when pay dirt was reached it was planned to hoist such and dump it into a screen to take out large stones, the finer portions passing into a second shaft or underground tank, kept constantly filled with water, and into which was fitted the short leg of a 16-inch syphon, which was supposed to suck up the tailings leaving the gold to settle in the bottom of the tank, to be eventually cleaned out, while the tailings were to be carried off for over 300 feet by the long leg of the syphon.

As before said, the success of the process has not been demonstrated here in practice. The company has erected a fine office heated by hot water, bunk-house, store-house, and workshop—the whole being in charge of a caretaker.

September 6th.—The pack-train was sent on from Granite creek to the west shore of Otter lake, 4 miles above the town of Tulameen, a total distance of 12 miles, while the Provincial Mineralogist went to the latter place to obtain the services of a local prospector to point out the exploratory workings for coal on Collins gulch, which were then visited.

Collins Gulch Coal.

Collins gulch is a small stream entering the Tulameen from the south, about 20 miles above the forks at Princeton, or about 6 miles above Granite creek and 2 miles below the new town of Tulameen. In about 1½ miles the bed of the stream rises 750 feet above the river, at which point coal was found outcropping in the bottom of the creek on land held by the Nicola Coal Company of Vancouver. In the bed of the creek, dipping to the south at an angle of about 35° as exposed, there are beds of coal interbedded with bands or beds of shale and sandstone or fine-grained conglomerate, and which appear here in the creek bed to amount in thickness to about 15 or 20 feet, but quite how much it is impossible to say, as no work has been carried on, and the only stripping done has been by the stream itself.

On the right side, a few yards below, there is in the steep bank an exposure of the same coal seam, which here appears to be much contorted and folded, showing a sharp anticlinal much broken and altered by such disturbance. At this point a "tunnel" had been run in for 5 feet, but had caved in. *Sample 111*, referred to below, was taken from part of the seam affected by the faulting and movement of beds, which appears to have altered the coal, while sample 112 was from the same bed, but some 20 feet from such line of movement.

	Sample 111.	Sample 112.
Hygroscopic moisture	5.08	7.87
Vol. combustible matter	31.58	30.59
Fixed carbon	57.06	51.10
Ash	6.28	10.44

The coke in each case was non-coherent, and the ash a light gray, tinged red and not fused under high heat.

It may be here noted that Dr. Hoffmann states in the Report of the Geological Survey, Part R., Vol. XII., that he analysed two samples of coal received from Mr. Geo. de Wolf, of the Nicola Coal Co., "described by the sender as one from a seam 16 feet thick, and the other from a seam 20 feet thick on Collins gulch," undoubtedly from this same locality; and he finds one yielding "by fast coking, a firm, coherent coke and the other by fast coking, yielding a coherent but tender coke." In consequence of this difference, the samples personally collected by the Provincial Mineralogist were again repeatedly analysed, but nothing approaching a coke could be obtained.

The local guide engaged at Tulameen to show where operations had been conducted said that those visited were the only workings on Collins gulch, but that various test pits had been sunk and the coal traced for about four miles east, nearly to Granite creek, and also for some distance to the west. He stated, however, that all these pits had caved in during the winter, and, as the coal did not outcrop through the wash, it was no use visiting them.

There is no doubt but that coal exists on Collin's gulch in beds of considerable thickness, but the development work in the condition found would not justify a statement of what this thickness is, nor could it be determined whether the coal was free from shale.

Sept. 7th.—A steep trail, leading from Otter lake up the hills to the west, was followed, gaining in about two miles an altitude of 4,900 feet or about 1,700 feet above the lake. Here, at the head of Elliot and Dry creeks, there were found to be a number of locations, on few of which any work had been done.

Freddie Burn Group.

This property is owned by Spearing, Brooks and Burn. An open cut 12 feet by 5 feet, with an 8-foot face, showed an interbedded band of schists about 4 feet wide, much silicified and impregnated with iron sulphides and a little copper pyrites. A tunnel 21 feet long, run from a 30-foot open cut with the evident intention of cutting a showing of quartz on the hillside, had not as yet encountered the lead underground and no mineralisation of importance was visible therein. A sample taken from the open cut for assay gave $3.20 in gold per ton.

The *Cousin Jack Group*, consisting of the *Cousin Jack*, *Ymir*, *Penobscot*, *Monte Verde* and *Chilliwhack*, was next examined. On this was found a 29-foot tunnel, with a timber approach 15 feet long. In this tunnel there was exposed a similar silicified band in the schists, about 6 feet wide and mineralised in the same manner. A sample taken for assay gave $3.20 in gold and $\frac{6}{10}$ oz. in silver per ton.

International Group.

Over the summit at the head of Boulder creek, which latter stream flows to the south, there was found, at an altitude of 5,200 feet, the *International Group* consisting of the *Constitution* and *International* mineral claims, owned by Clackman and Johnson. The formation here was schist, seemingly somewhat metamorphosed from some adjacent igneous rocks, and in this there is a flat quartz vein, dipping to the west at an indefinite angle. This vein was on the average about 10 inches wide, although it swelled into quite large bunches in places, and carried iron and copper pyrites; the development, however, did not indicate in what quantity these might be expected to be found. A sample taken of sorted ore gave 9.3 % copper, a trace of gold and .76 oz. of silver per ton. The development consisted of two open cuts, one 40 by 6 feet with a 12-foot face, and the other 30 by 6 feet with a 14-foot face.

Sept. 8th.—Camp was moved to the forks of the Otter, a distance of 14 miles, where the valley widens out, leaving a stretch of bottom land. Several fine ranches were passed during the day.

Sept. 9th.—A drive of about 20 miles was made, in a rain storm, up the main fork of Otter creek to the north end of Aspen Grove camp, about three miles north of Dodd's stopping-house, where a short stay was made to buy provisions. At this point the trail up Graveyard creek from Princeton joins the waggon road.

ASPEN GROVE CAMP.

Aspen Grove camp was, at the date visited, practically only a year old and the time of prospectors had been more occupied in securing new locations than in developing those they had. Of the hundred or more claims located only a few had had anything more than the barest assessment done on them, a notable exception being those of Bate and partners, who have "lived" with their claims and are putting in all their time on their various properties. These are so numerous that when the work is spread over all it is a rather small amount on each claim. Their work on the *Cincinatti*, while extensive for prospectors, has not as yet borne fruit. It must be considered then that, so far, the showings in this camp are only indications and considerably more work must be done before any conclusions can be arrived at, except in a very general way. Among these general conclusions would seem to be that, from Copper mountain, 10 miles south of Princeton, northerly at least as far as Nicola, and following a fairly straight line, there is a wide belt of later igneous rocks which, for that whole distance, are more or less mineralised with copper sulphides, not uniformly but along bands or zones and in these zones the mineralisation varies from local causes. In a general way the mineralisation found on Copper mountain is of the same character as that of Aspen Grove, while at several intermediate points recent locations have been made on the same class of deposits.

These rocks probably belong to the volcanic part of Dawson's "Nicola Series of the Interior," and underlying the coal-bearing rocks of this section and containing beds of limestone and argillite, which are now much altered.

This long basin appears to be bounded on the east and west by light-coloured granites, schists and crystalline rocks, which, in the Aspen Grove camp, appear on either side of the mineral belt, here about a mile wide and having two important "lime dykes" running through it, each some 300 feet wide and about 2,000 feet apart.

Such preliminary work as has been done on this belt indicates that the mineral zones are large but very low-grade, general samples from any of the exposures not running over about 2 % copper, with very small additional values of the precious metals. One or two local concentrations have been noted, but these are as yet undeveloped and unproven as to extent.

It seems probable that, in this great extent of copper-bearing rocks, concentrations will eventually be discovered which will permit of profitable mining. At present these remain to be found, but it would seem as though this was one of the most promising fields in the Province for the prospector.

In Aspen Grove camp a number of the prospectors seem to have either been led astray by false assays or have wilfully deceived themselves as to values, for their statements of assays previously obtained on certain cuts are not borne out by official assays of samples taken—sometimes by the prospector himself—for the avowed purpose of checking such claimed values.

It is premature to pass opinion on this camp, and all that can be done is to report on such surface prospecting as had been done at the time. Only a small proportion of the claims located were visited, but the conditions prevailing in those examined were so uniform that it is fair to think they about represent the camp.

Big Dutchman Group.

This group consists of 5 claims, including the *Big Dutchman*, *Yankee*, *America* and *Canada*, situated at the north corner of the Aspen Grove camp, and upon the slope draining into the north fork of Quilchena creek. The claims are said to be each held in the name of an individual, but they have been grouped together under a mining partnership composed of J. E Bate, S. J. Bate, J. A. Hinshaw, R. J. Armstrong and J. R. Hunter. The properties have been developed by a number of open cuts.

The 1st open cut consists of surface stripping to a depth of 3 to 4 feet with a pit 10 feet deep, in a rock which has the appearance of being a volcanic agglomerate or breccia containing considerable lime.

The 2nd cut is 100 yards to the north of that last mentioned, and is a side-hill cut 6 feet wide, running into the hill for 20 feet, with a 12-foot face.

The 3rd cut is some 15 feet below the last, showing the same rocks, apparently dipping at 20° to W., as indicated by various layers of fragments of varying sizes, and here exposed for a width of about 120 feet.

The 4th cut is through 25 feet of the same class of rock, showing much lime, and at the end there is a sheer face 15 feet to 20 feet high, "slickensided," as though indicating a fault slip.

Some 400 to 500 feet away from these last are the 5th and 6th cuts. These are side-hill cuts, respectively 40 feet by 5 feet deep and 30 feet by 6 feet deep.

The work indicates, probably extending through all of the claims, a band of agglomerate some 150 feet wide at least, associated and blending into a band of a finer grained volcanic rock, classed as an andesite, and this again with a "dyke" of impure lime with no clearly defined contact or line of demarcation, and all having a general trend about N. 30° W.

Throughout this area there appears to be a zone from 100 to 120 feet wide, fairly uniformly mineralised with copper, chiefly as copper glance, in minute flat flakes, distributed more or less generally throughout the rock and showing in every piece of it. This was claimed by Mr. Bate to have been repeatedly assayed, and to run 5 % in copper, with silver and gold values. This statement of Mr. Bate's was challenged at the time, and he was requested to take a sample there to confirm it. He therefore took an average sample over 15 feet of exposure in the 6th cut, and this was assayed by the Provincial Assayer, who reports—

Cu = .9 %; Gold = .02 oz. per ton; Silver = .3 oz. per ton.

Special samples of ore similarly assayed gave—

Cu = 4.2 %; Gold = .02 oz. per ton; Silver = 1.0 oz. per ton.

That there is a mineralised area or zone continuing pretty well over the claims is proven, but it is also a fact that such zone, as exposed, yields very low assays, so low as to be at present valueless, although it is quite probable that on these claims there may be found points in which there will be discovered a greater concentration of values than above noted.

Golden Sovereign Group.

This group lies to the south-west of and adjoining the *Big Dutchman*, and consists of the *Sovereign*, *Frisco*, *Great Western*, *Great Republic* and *Last Chance* mineral claims, owned by |Bate Bros. *et al.* On the *Sovereign* there is a surface exposure of the country rock, which is somewhat similar to that seen on the *Big Dutchman*, but more fused together and not showing the fragments so distinctly, while small seams of copper glance, and occasionally of metallic copper, were noted, the latter sometimes in pieces of considerable size, up to as much as 100 lbs.

This zone is about 150 feet wide and seems to be parallel with that on the *Big Dutchman*, about 300 feet from the line of such, and separated therefrom by a "dyke" of impure limestone about 150 feet across. Some 26 to 30 sacks (100 lbs. each) were standing on the claim, filled with metallic copper and red oxides, which were reported as having been taken out of a cut about 50 feet long, and along a line of fissuring in the rock. Below this fissure, nuggets of metallic copper are plentiful in the surface wash.

There has been practically no work done on these claims, the values indicated being apparent on the surface, so that the extent of this metallic copper impregnation is not shown, but as far as it goes it is most encouraging.

Big Sioux Mineral Claim.

This claim lies to the south-west of the *Golden Sovereign*, on Bald mountain, and is owned by Henry H. Schmidt. On this a shaft 30 feet deep had been run on an incline, but had afterwards been squared and turned into a large vertical shaft preparatory to being timbered, and could not be descended. This opening had been made on a showing of from 3 to 4 feet of high-grade copper glance ore, and about the same thickness of low-grade ore of the same class. From work done in the shaft, these leads appear to run about S. 75° W., and to dip at angle of 75° to north.

The country rock appears to have been of igneous origin and somewhat similar to that of the rest of the camp, but at this point it has been considerably altered and now approaches to serpentine. The work and consequent exposures of the rock have been confined to this pit and to a cut some 200 feet away to the south-west, where indications of the same lead, though not so rich, were found.

It seems probable, from the indications presented, that there is here a similar ore zone, running about N. 30° W., as on the other properties in the camp, and that across this, in a S. 75° W. direction, there is a fissure with some crushing of the rock, through which mineralised water has infiltered, altering the rock on either side for some distance, and forming a local enrichment in the zone along the line of the fissure.

On the dump, beside the shaft, there were about 50 tons of first grade ore and about the same quantity of second grade. This was roughly sampled, and the first grade gave, on assay, copper, 12.6 %; silver, 2.4 oz. per ton; gold, .02 oz. per ton, while the second grade would contain about 3 to 4 % copper. This was the only claim noted in this camp where a local concentration of values had occurred, and as such it had attracted much attention. Here, as elsewhere, the development was not sufficient to show to what extent the mineralisation extended. Certainly, for the work done, it has made a remarkably good showing.

Giant Mineral Claim.

This full claim and a fraction below it are also held by Henry H. Schmidt. In an open side-hill cut, 15 feet by 15 feet, with a face 10 feet high, in a coarse agglomerate, associated with a fine-grained igneous rock, probably a tuff, there is a heavy impregnation of copper pyrites, more in stringers and lenses than noted elsewhere in the camp, while the fine-grained rock is impregnated with small particles of copper glance, as noted elsewhere, the general trend of the rocks here being N. 30° W.

A few feet lower down the hill two trenches had been cut across the "lead," and were said to have exposed mineral, but they were caved in at the time the property was visited and this could not be confirmed.

Some 50 feet vertically below and 50 feet to the north of this open cut, a 40-foot cut, with 14 feet depth at the face, had been run in gravel wash, striking solid formation in the lower corner, and with the evident intention of starting a tunnel.

The *Maggie* mineral claim lies to the west of the *Big Sioux*, and is held by Hy. Schmidt. On this there is an 8 by 12-foot shaft down 16 feet, which could not be descended, but showing a similar mineralized zone, striking N. 25° W., and containing copper as pyrite and bornite. The work done was insufficient to indicate the value of the property.

On the *Big Kid* mineral claim, owmed by Frank Mansfield, there is an open pit, 6 feet by 8 feet by 8 feet deep, exposing a fine-grained, igneous rock, inclined to be amygdaloidal in parts, and showing little stringers of copper pyrites in small fissures, but not in sufficient quantity to constitute ore. There were reported to be other showings over the edge of the bluff, but these could not be found.

The *Golden Gate* mineral claim, owned by John Finn, lies to the north and slightly to west of the *Cincinatti*, on the west slope of the hill and at an elevation of 4,150.

In what is apparently a dyke from 10 to 12 feet wide, of a lighter colour than the general rock, inclined to be porphyritic in structure and containing much lime, there is an impregnation of copper sulphides, but not in important quantity. This dyke, if such it be, trends N. 20° W., and is traced on to the *May Belle* to the north and the *Medal* to south.

The *Medal* mineral claim, owned by J. B. Bate, is apparently an extension of the above, though somewhat pushed out of line, and contains fine copper sulphides and fine particles of what appeared to be metallic copper. The face of the cut was sampled and showed: copper, 1.2 %; gold, .02 oz. per ton; silver, trace.

Cincinatti Group.

This group lies to the south-west of the *Big Sioux* and *Golden Sovereign* and is owned by Bate *et al.* It consists of six mineral claims, viz.: *Bank of England*, *Cincinatti*, *Noble Five*, *Queen of West*, *Newport*, and *Copper Butte Fraction*.

On the *Bank of England* an open side-hill cut of about 15 feet, with a 15-foot face and a pit at the end 6 feet deep, shows a zone of the same class of igneous rock exposed for 15 feet, heavily mineralised with copper sulphides and some oxide. This zone apparently followed here along a slip or fracture in the rock, dipping at an angle of 70° to south-west, through which water percolated and possibly enriched the zone noted. The face of the cut was sampled and gave: copper, 1.5 %; gold, .04 oz. per ton; silver, trace.

Two similar cuts to the north on the same claim were not visited.

On the *Cincinatti* a zone 100 feet wide has been exposed and opened by cuts. This is apparently uniformly impregnated with copper glance all across, and was so reported by the owner, who claimed to have had average assays running over 10 % copper, but this statement is not borne out by samples taken at the time by the Provincial Mineralogist and which gave: copper, 1.53 %, while selected ore assayed 3.24 %.

A tunnel, started at 100 feet lower level, was being driven to cut this body of ore and had then been completed for 260 feet, but was not in far enough to strike it.

Portland Group.

This group consists of four claims, the *Portland*, *Covington*, *Vicksburg* and *Quebec*, located to form a square, the four No. 1 posts being together. It is situated at the southern end of the camp, 3 miles from the *Cincinatti*, on the hill to the east of Dodd's post office. The property is owned by Bate *et al.* and was said to have been bonded to a Mr. Wright, of Vancouver. This seems to be also a copper impregnated zone, over 30 feet wide, in the same agglomerate rock, striking in the same direction.

On the *Quebec* there was an open cut 30 by 7 feet, with 12-foot face, which was sampled and gave: copper, .9 %.

On the *Vicksburg* there was an open cut 15 by 6 feet, with a 10-foot face.

To the south-east of the *Portland Group* is the *Calamity Jane Group*, held by T. A. Rogers *et al.*, and south-east of this are the *Lone Star* and other groups, all supposed to be on extensions of the same mineralised zone of rock.

The *Boomerang Group*, owned by Bate *et al.*, consists of four claims, all in line along a supposed dyke adjacent to a band of impure limestone.

These are all similarly mineralised and have little work done on them. A sample, or rather specimen, of the ore assayed: copper, 14.7 %; gold, 0.12 oz.; silver, 2.16 oz. per ton.

The *Copper Standard Group*, of three claims, owned by Litchfield, of Otter flat, is supposed to be on the same lead as the *Cincinatti*, but one mile further to the north, where, along the face of a 50-foot bluff, a few open cuts have been made.

The *Lytton* mineral claim, owned by J. B. Silverthorn, of Lytton, shows an open pit 9 feet deep, on what seems to be a small "lime dyke" running parallel and 400 feet from the west "lime dyke." The assay values are very low.

The *Georgia* mineral claim lies to the north of the *Lytton*, and is owned by T. A. Rogers. On this a tunnel has been run in for 30 feet, with a 10-foot cross-cut, and a 25-foot open cut has been made in a fine-grained volcanic rock, similarly mineralised but only to a slight degree, an average sample taken of the ore body not showing commercial values.

The *Copper Belle Group* consists of four claims, owned by Lowe & Brown. The country rock here is about the same class as in the rest of the camp, though inclined to be amygdaloidal in places.

On the *Copper Belle* claim, on a 100-foot bluff running N. 20° E., there is an outcropping along the edge showing copper ore, not very clearly defined but supposed by the owners to follow the bluff. It is practically undeveloped except for an open cut 18 feet by 20 feet, and the beginning made for a tunnel.

On the *Blue Bird* there is an open cut 20 feet by 5 feet with a 12-foot face, but seemingly so far in slide rock.

The *Little Lottie Group*, having the same owners and consisting of the *Happy Jack*, *Little Lottie* and *Lottie Fraction* mineral claims, has, as yet, only had a few small open cuts made on it, and is of the same class. A little galena shows here, the first noted in the camp. The work so far indicates some very fair values in copper, but Mr. Lowe says these values are very spotted.

September 15th was spent examining the headwaters of Quilchena creek, which flows into Nicola lake at Quilchena, and which is incorrectly marked on the Government maps as Hamilton creek. The rocks here are all close-grained basalts, usually of very dark colour, lying in beds, flat and undisturbed where cut by the stream and showing no mineralisation.

September 16th.—Camp was moved 16 miles to Hamilton creek, a small stream four miles out from Nicola, which flows into the Clearwater. On Hamilton creek, just above the stage road, some boring had recently been done for coal, it was understood by the Nicola Coal Co. The plant and those operating it had moved away a few weeks before, and no reliable information could be had as to the results of the bore-hole, but it was understood that coal had been struck here underlying the surface measures.

On the side of the stage road near Saw-mill creek, the *First* mineral claim, located by Neil Campbell, was visited. Here was found a pit 8 feet deep, but no values could be seen either in the rock on the dump or in place. The claim is said to have been purchased by Mr. Coleman for the Boston and B. C. Mining Co.

The *Bonnie Doone* mineral claim, owned by Corbett & Schmidt, is situated on a bald hill to the west of Hamilton creek and the valley of Nicola river, at an altitude of 4,200 feet. Here, in a formation of fine-grained, dark, igneous rock, there was noted an iron-stained dyke cutting across, near which the formation appears much cracked and seamed with small stringers of quartz, and also of calcite, with which latter there is considerable yellow copper in bunches, although the stringers are too small to be of commercial importance.

Coal at Nicola.

Within the past year a great deal of interest has been aroused in the coal deposits of the Nicola valley, and several bore-holes have been put down, on the results of which the land will be taken over by one of the several companies operating, so that, naturally, these results have been kept very private, and such reports as have been allowed to get out have no guarantee of accuracy. It seems, however, to be pretty well authenticated that coal does underlie the greater part of the low flat valley near Nicola, and it is probable that, if such be a fact, the measures will be found to be comparatively undisturbed and continuous, as there is no evidence of any serious movement of the rock formation here.

The only places heard of where exposures of the coal could be seen were on the Coldwater river and on Coal gully. These are not new exposures but points at which coal has been taken out for years by the ranchers for local consumption and blacksmith purposes. They are mentioned by Dr. Dawson in his Report for the years 1877-8 of the Geological Survey.

Garesche-Green Coal Lands.

Iron mountain, so called by Dr. Dawson, forms the point between the Coldwater and the Nicola rivers on the north-west, and would appear to be underlaid by coal, one outcrop of which is on the left bank of the Coldwater, just above and across the river from the Indian reserve. It is reported that there was an outcropping in the bed of the river and that some work was done on it, but this had long since been filled in by the action of the stream and could not be found. On the steep bank of the river, which rises here for some distance as a bluff, there was a coal seam of from 10 feet to 12 feet exposed, dipping at an angle of 20° to the north. The coal was covered by 24 inches of conglomerate and this by a thick bed of finer-grained sandstone. Underneath the coal there were 18 inches of sandy shale and clay, below which were 12 inches of a fine-grained, white sandstone and under this coarse gray sandstone of undetermined thickness. The sandstones and conglomerates were composed chiefly of granitic material and appeared to be cemented together with calcareous matter. The early settlers had mined into this seam and there is still remaining of their excavations a chamber 30 by 40 feet, supported by timbers now so rotten as to be dangerous. The place was entered, but no sectioning of the seam was attempted. In the coal seam there were bands of sandstone and shale, not very thick and which would probably disappear with depth in the basin. It was estimated that there were about 6 feet of good workable coal in the seam exposed. The coal has a bright clear appearance, although some layers are dull. It does not disintegrate on weathering, and does not soil the fingers, and the fracture is sub-conchoidal. The following is an analysis, by first coking, of a sample taken well under cover.

Hygroscopic moisture	=	2.13
Vol. combustible matter	=	27.99
Fixed carbon	=	59.66
Ash	=	10.22
		100.00

The coke was firm and coherent, but dull.

The coal when boiled with caustic potash imparts a slight brown colour to the solution and the colour of the streak is not as black as from a true bituminous coal. The small amount of hygroscopic moisture would certainly indicate a true bituminous coal, while all the other tests point to a lignitic coal, which latter it probably is, the water together with some of the volatile matter having been more or less driven off by the volcanic rocks which form the upper part of the hill.

Crossing over the shoulder of Iron mountain to Coal gully, at a point above Blair's ranch on the Nicola river slope, another coal outcropping was found about 300 feet vertically above the valley and a mile back from the river. This is probably the same bed as seen on the Coldwater, though in the wash-covered country it is impossible to trace it on the surface. There are here indications of a series of small flat faults, stepping down towards the valley below, which seemed to be local in extent and were accompanied with such movement as to render the dip unreliable. The coal here occurred in the same manner as on the Coldwater, but the bed appeared to be thicker and the partings less marked. A tunnel had been run in on the right bank of the gully for 75 feet, partly cross-cutting the seam. After proceeding in for 25 or 30 feet the level took a step up for 4 feet, whether on account of a fault or to get into an upper part of the seam could not be determined. The workings are badly timbered and the coal is being mined, at present, in a crude way, or, rather, gouged out without any system. At the face it is filled into sacks in which it is hauled to the tunnel mouth by hand and thence taken down the hill on a "stone boat"; it is then loaded into waggons and taken to Nicola, eight miles distant. The following analyses of a sample taken from the face shows the coal to be identical with the previous exposure.

Hygroscopic moisture	=	3.35
Volatile combustible matter	=	26.55
Fixed carbon	=	59.30
Ash	=	10.80
		100.00

Coke firm and coherent, but dull.

September 17th.—The pack train moved into Nicola while the Provincial Mineralogist was inspecting the coal exposures, and here he joined it again in the evening, camp having been made at the back of the town, beside an irrigation ditch.

September 18th was spent in Nicola, attending to mail matter received here and renewing the supply of provisions.

September 19th.—A move was made down the Nicola river to 10-Mile or Guichon creek, which latter was followed up for 12 miles to Brown's camp, a distance of 24 miles.

Manchester Mineral Claim.

This claim is held by Jno. Clapperton, of Nicola, and is situated on the left bank of 10-Mile or Guichon creek, about 12 miles from the Nicola river. Here a shaft had been sunk for 32 feet in a granular quartzose rock, but it was partly filled with water and could not be examined. In the bottom of the shaft it is reported that there is a quartz band of 36 inches in the country rock, carrying iron, etc., and assaying about $6 in gold. No samples could be obtained.

The *King Solomon* mineral claim, held by Deeks, Brown *et al.*, is on the right bank of the creek, about one mile higher up than the last claim. Here, rising directly from the creek, there is a disintegrated granitic bluff, cut by dykes all having a strike N. 60° W., and dipping 80° to S. E.

A tunnel had been run into the bluff for 20 feet, with a 20-foot cross-cut, which shows the country rock to contain all through it minute particles of native copper to the extent of possibly ½ % copper, as judged by the eye, it being impossible to sample such a deposit. Nothing was being done with the property, but it certainly looked as though the ore could be concentrated to a profit.

Across the creek was the *Midnight* mineral claim, having the same owners and said to be practically the same class of deposit. This was not visited, as the stream could not be crossed here.

Aberdeen Group. This property consists of the *Plymouth Queen*, *Aberdeen*, *Nicola Belle*, *Copper Mound*, *Forrest Rose*, *Cowboy* and *King Solomon's Dream* mineral claims, which extend in a line to the west, up Brown's Creek. It is owned by the Bromhead Syndicate, Jno. Clapperton, Agent, Nicola. In a hill projecting into the valley of the creek, a shaft had been sunk for 57 feet, but was filled with water. Right beside this a tunnel had been run in for 110 feet, with a 16-foot cross-cut to the right. In the shaft there was reported to have been a stringer of ore, starting in at 25 feet down, where it was 6 inches wide, while at the bottom of the shaft is was 22 inches wide. The tunnel cuts through a small body of ore, which goes off to the right, and outcrops at the tunnel level on the other side of a knoll, only a few feet away.

It is claimed, however, that the main ore body is still to the right of the tunnel and has not been cut, but this could not be seen. Above the tunnel there is the outcropping of a vein carrying considerable values in copper as carbonates, oxides, etc., and it looks as if this was in a slide which came from the left of the hill. There is a little good copper ore in sight but not much. The property has some promise but is quite unproven.

The *I. X. L. Group* of four claims, owned by J. W. Collis and E. P. Dunn, is situated about 2 miles up the creek and is about 4 miles south of Mamette lake. A timbered shaft, filled with water, was down 100 feet, with a 25-foot cross-cut off at 85 feet down. This was in a decomposed granitic rock, carrying specular iron and with some copper as bornite and copper glance occurring in small stringers, but the quantity so exposed is not important. There are small open cuts on the property showing a little copper, also not as yet important.

September 21st.—The waggon road up Guichon creek was followed to Louis Quienville's ranch, where the trail towards Kamloops was taken and followed up for 5 miles from the waggon road. Here a camp was made on the summit, near the headwaters of Meadow creek.

September 22nd.—Louis Quienville came up from his ranch to point out his claim—the *Montezuma*—situated about a mile east of the camp at an elevation of 5,500 feet, or 2,800 feet above the valley. The rock in this claim is an amygdaloidal trap, the cavities being filled with some white mineral and the seams with calcite, with which latter is associated a small quantity of copper glance and some carbonates, not in quantity to be of value as exposed. A second dyke, 3 feet wide, of the same sort of rock, cuts through in a N. 20° E. direction. The development consists of open cuts, the first 50 feet long, through the top of a knoll, reaching a depth of 4 feet; the second, 15 feet long, 3 feet wide and 4 feet deep; and the third, through wash, 15 feet by 3 feet wide and 10 feet deep at the face, where it is evident that a tunnel is to be started to cut a showing on the surface, 5 feet above the cut.

September 23rd.—Camp was moved to the Fish lakes, the headwaters of Guichon and Meadow creeks, a fine, open, bunch-grass country, much taken up for cattle ranges and valuable for the hundreds of acres of grass meadows. Thousands of tons of hay are cut here for wintering cattle. The wash, as seen here occasionally, is granite, but no solid formation was visible along the trail.

September 24th.—Camp was moved to a point about 6 miles out from Kamloops, an attempt to find the *Python* mine having failed.

September 25th.—The *Python* mine on Coal hill was examined, but as this was the only property visited in this section it will be reported upon at another time with the rest of the claims of this camp.

September 26th.—Acting under instructions from the Acting Minister of Mines the pack train was disposed of and the Provincial Mineralogist closed up the season's work and reported in Victoria on September 30th.

INSPECTION OF METALLIFEROUS MINES.

REPORT OF JAMES McGREGOR, INSPECTOR.

I have the honour to submit my annual report of the condition with regard to safety of the Metalliferous Mines of the West Kootenay (except Goat River Division), Grand Forks, Kettle River and Yale districts.

In the Slocan District all the work is by tunnelling, with the exception of a few winzes, which all have ladder-ways and are only used in case of the need for an escape. I found the timbering in these mines efficiently carried out. Since my last report two extra aerial trams have been installed, one from the *Ivanhoe* and one from the *Last Chance*. The mines have not worked to as full a capacity as during the previous year.

In the Ainsworth district very little has been done since my last report. Some prospecting has been carried on in the Lardeau district, and also a small amount in the vicinity of the town of Ainsworth.

The mines in the Nelson District have made considerable progress during the year. What machinery, ropes, etc., are being used are in good condition.

In the Trail Creek District the machinery, ropes and safety catches in both incline and perpendicular shafts have often been tested, and I find them working well. The ladder-ways are in good condition, but are rarely used, as the men ride up and down on the skip. Most of the mines have a skip tender. Some of the mines in the vicinity of Rossland are connected underground one with the other, affording a good avenue for escape in case of accident. The timbering is well kept up in the stopes.

In the Boundary District every effort is being made to keep the mines in a safe condition. The ropes, machinery and safety catches are watched carefully and often tested. Two large mines in this district, near the town of Phœnix, have been closed for some time, namely, the *Stemwinder* and *Brooklyn*.

REPORT OF ARCHIBALD DICK, INSPECTOR.

I have the honour to submit my report as Inspector of Metalliferous Mines for the East Kootenay District and the Goat River Mining Division of West Kootenay. During the first six months of the year I was Inspector for both East and West Kootenay.

I visited at different times the mines in the neighbourhood of Rossland, in the Trail Creek District, in the Nelson District and those in the neighbourhood of Phœnix and Greenwood in the Boundary District, and of Sandon in the Slocan District, but more especially those in the East Kootenay District in the neighbourhood of Moyie, Kimberley and Perry creek. All the mines I found to be in good order and well timbered.

I visited the scene of many of the accidents reported and inquired into their occurrence, but in no instance did it appear that any blame attached to the mining companies. I would call attention to the number of accidents from missed shots. That so many casualties should occur through unexploded powder would appear to indicate something at fault, since the miner charges all the holes in the same way, very probably with powder taken from the same box. The cleaning out of missed holes to reload, which is so frequently done although the risk is well known, should not be allowed under any circumstances.

REPORT OF THOS. MORGAN, INSPECTOR.

I have the honour to submit my report on the Inspection of the Metalliferous Mines of Vancouver Island and Texada island :—

Lenora Mine. I inspected this mine, situated at Mount Sicker, and made my official report to the Department of Mines on 22nd of July, 1901. No accidents were reported and nothing transpired rendering a further inspection necessary. I found the mine, with its tunnels and workings, to be in a safe condition, and the ventilation was very good. Careful management was evident in all the extensive works of this property.

Tyee Mine. My official inspection and report on this mine, also at Mount Sicker, were made on 22nd July, 1901. A fatal accident occurred at the Tyee mine on the 4th August, when Charles Melrose, foreman of a shift, fell down the shaft and was killed instantly. It appeared that deceased and Edwin Guns, a miner, went down the shaft to open the hatchway, for the purpose of letting out the smoke, which proceeded from shots which had been fired at the first landing and also at the bottom of the shaft, about 15 minutes previously. The two men got off the bucket at the first landing and rang the bucket up, about six feet, then opened the hatchway to the north of the shaft, and walked round to the west side to ring the bucket down. Melrose made a mis-step in going to ring the bell and fell through the hatchway, a distance of 91 feet to the bottom. An inquest was held and the jury returned a verdict of accidental death. I made full inquiry on the spot and do not think that the management was in any way blameable.

On 16th August, John McInnis, foreman, had three of his ribs broken by a fall of rock at the bottom of the main shaft, where a station was being cut. The ground behind the timbers in the station was loose, and McInnis was removing a short stull, for the purpose of putting in a complete set of timbers. While he was doing this, the rock fell from just above him and struck him in the side. The shaft is closely timbered down to the station, and it was during the time that the rock in the station itself was being caught up that the accident occurred. The station is nine feet high, and the rock fell from below the top set of the station. I examined the place and consider that it was a pure accident. McInnis soon recovered and was at work again. The shaft is well timbered and the ladder-way secure. The machinery and hoisting gear were in good working order, and the mine generally well managed.

Monitor Mine. My inspection of this mine, situated on the Alberni canal, took place on the 28th August, and was duly reported to the Department of Mines. The surface plant, aerial tramway, workings and ventilation of this mine were all in good order. No accidents were reported.

Nahmint (Hayes) Mine. On August 29th I inspected and reported on this mine, also situated on Alberni Canal. The mining, which is by extensive tunnelling, is well laid out for safe working. Natural ventilation serves two of the tunnels, the other being by a fan driven by water power. The supply of fresh air for the workmen is ample. An air compressor for driving 10 Burleigh drills also furnishes air to the workings. The aerial tramway, from the mine to the bunkers at the shipping wharf (2,000 tons capacity), of 5,100 feet, completed since my official report, is working satisfactorily. No accidents are reported.

Marble Bay Mine. On 15th October I visited Texada island and made an examination of this mine. The natural ventilation, assisted by compressed air, was very satisfactory, and the mine is timbered all up to the faces in good substantial form. The ladder-ways are quite safe, the shaft in excellent order, and the surface works are efficient. I made my official report to the Department in due course. No accidents are reported.

Cornell Mine. On 16th October I examined this mine, also on Texada island, and found the shaft and works in good and safe condition, well timbered. The ventilation, both natural and compressed air, was very good. My official report was duly made. No accidents are reported.

Golden Eagle Mine. I made no inspection of this mine at the time of my visit to Alberni, as there was only a small force at work. On the 31st December an accident occurred by which William Struthers was fatally injured, and died thirty hours afterwards. My information is that the deceased and his partner, while working in the face of the cross-cut tunnel, had blasted eleven holes, all of which exploded an hour before the occurrence of the accident, and that deceased was in the act of removing broken rock, using a pick on the bottom of the tunnel, when there was an explosion. The verdict of the jury at the inquest which was held was:—"That deceased came to his death by the accidental explosion of a portion of gelignite which had been used for blasting purposes in the face of the tunnel, and which, apparently, had failed to explode at the time of firing some round of holes immediately preceding his death."

As my official reports made to the Department contained minute details and descriptions of the several mines and their employees, the systems of working, etc., I have assumed that a repetition of such details is not required in this annual report.

LIST OF ACCIDENTS IN METALLIFEROUS MINES DURING THE YEAR 1901.

January 9—John McDonald, cut on head by a falling collar brace in Le Roi mine.
〃 18—John Kennedy, killed by falling down open stope in Ruth mines.
〃 24—George Reycraft, head cut by falling in lumber shed, Le Roi mine.
〃 26—J. A. Herne, leg broken by fall of a piece of loose ground in Le Roi mine.
February 10—Leon Bodkin, killed by explosion in west drift, 900-foot level, Le Roi.
〃 20—Samuel Marshall, ankle dislocated, small ankle-bone broken and back injured in trying to avoid coming over the knuckle of the shaft while on the bale of the skip in Le Roi mine.
〃 26—P. Grieson, killed by explosion through cleaning out a missed shot in Le Roi mine.
〃 26—J. Dehlin, slightly injured in above accident.
〃 26—J. Ritchie, slightly injured in above accident.
March 25—A. B. Emery, compound fracture of left leg caused by a falling drill in Le Roi mine.
April 3—Fred. Mutton, killed by explosion of powder in Nickel Plate mine; how the accident occurred is not known.
〃 21—J. H. Jungle, left leg badly bruised by falling rock in Le Roi mine.
〃 22—T. Mimsick, left leg badly bruised by some falling rock in Le Roi mine.
〃 23—J. McEachern, fatally injured by fall of rock in Le Roi mine.
〃 24—Andrew Ohlsen, killed by striking unexploded powder with his pick in south drift, Nickel Plate mine.
〃 27—Charles Lund, hand cut by being caught between car and timbers in Le Roi mine.

" 27—Ben. Senior, foot crushed by cage in Le Roi mine.

May 9—W. L. Jones, killed through explosion of powder while sinking winze on contract in Monitor mine; exact cause unknown.

" 9—Clement Davis, killed in same occurrence as above.

" 18—John Deegan, head cut, left leg cut and hip bruised by fall of ground in Le Roi mine.

" 22—James Ansen, nose cut off by fall of a piece of rock from roof in Le Roi mine.

" 22—Curtis Cook, hand slightly bruised by falling rock in Le Roi mine.

" 27—Havelock Gillan, died as result of scalp wound and internal injuries to chest through falling from cage in Nickel Plate mine.

" 28—Charles E. Rose, cut on head by flying block of wood in carpenter's shop of Le Roi mine.

June 3—Wesley Junkin, shoulder injured, when ripping some timber at Le Roi mine, through a flying piece striking him in the back.

" 8—Sy. Parr, leg badly bruised by staging giving way while lifting a cap in Le Roi mine.

" 13—Joseph Gill, died as result of severe injuries through falling from 700-foot pocket to bulkhead below the 800-foot pocket in Le Roi mine.

" 19—Norman Peterson, shoulder dislocated by fall in Le Roi mine.

" 19—Martin Holden, ankle dislocated and hip injured by fall in Le Roi mine.

" 20—John Sharpe, head and face cut through missed hole unexpectedly exploding in Le Roi mine.

" 25—A. F. Berry, left arm and leg bruised by falling about 12 feet in Josie mine.

July 7—Wm. Vance, fracture of right leg, lacerated wound left leg and severe bruises, through being caught between cage and shaft in Knob Hill mine.

August 16—John McInnes, ribs broken through fall of rock in Tyee mine.

" 20—Chas. Brott, killed by being crushed between cage and timbers and then falling down shaft in Silver King mine.

September 17—Herbert Porter, badly injured about face through fall of roof in Arlington mine.

" 17—R. H. Homill, killed in same accident as above.

" 17—Thos. McLeod, leg broken by a falling rock in King Solomon mine.

October 1—Joe Tresh, killed by premature explosion in Rambler-Cariboo mine.

" 10—Seymour Wells, hip injured and head cut through falling into pocket at 800-foot level, Le Roi mine.

" 11—Swan Johnson, eyes injured and sight endangered through explosion of missed hole in Brooklyn mine.

" 23—Hugh English, died as result of left leg being blown off, left eye blown out, and left fore-arm shattered through the explosion of an old charge while drilling at bottom of shaft in Iron Range mines.

" 27—Jack F. Smylie, feet and back hurt through cage falling from Black Bear to 900-foot station, Le Roi mine.

" 27—Robert Robinson, compound fracture of left leg; same occasion as the above.

November 21—John Faller, compound fracture of left elbow through his partner striking an unexploded shot with his pick in Payne Consolidated mine.

" 21—Louis Miller, face and scalp injured, eyesight endangered and groin injured; partner of Faller; same occurrence as above.

" 29—J. R. Gumaer, killed by surface tram at Josie mine.

December 8—John Cotner, right rib fractured by falling from seventh floor to floor below in Josie mine.

″ 9—G. S. Turner, compound fracture of leg, through falling down chute in Le Roi mine.

″ 14—N. H. Gillespie, fore-arm fractured, three or four metacarpals and one metatarsal, with punctured stone wounds about head, hands and legs, caused by explosion through drilling into missed hole in Snowshoe mine.

″ 14—Henry Sorstad, right eye punctured, left eye blown out, face cut and bones of face fractured, and compound fracture of tibia and fibula, in same accident as above.

″ 19—John Lannon, lacerated wounds on chest, left elbow, ear and face, and eyes severely injured, through explosion of powder in Old Ironsides mine.

COAL MINING IN THE PROVINCE.

The working coal fields of British Columbia are, at the present time, confined to Vancouver Island and the collieries of the Crow's Nest Pass Coal Co., situated on the western slope of the Rocky mountains, and, while discoveries of coal are reported from other parts of the Province and considerable prospecting has been done, no serious development work has yet been carried on. Certain locations of coal made in the Yale district were visited by the Provincial Mineralogist during the year, and reference thereto will be found on pages 1147, 1156, 1175, 1177, 1183 and 1184 of this Report. Nothing new has been learned regarding the coal deposits on the Peace river, Skeena river, Bulkley valley, or Queen Charlotte Islands.

THE VANCOUVER ISLAND COLLIERIES.

A slight decrease took place in the production of coal and coke by the Vancouver Island collieries during the year. The principal market for these collieries is abroad, chiefly in the United States, and the falling off of some 55,000 tons in the export trade may be accounted for by the increased use of oil as fuel in California. The coke output of these collieries, although rather less than during last year, still shows a considerable increase over the year preceding. With the completion of the smelters now in course of erection on Vancouver Island, there should be a large increase in the market for this commodity. A detailed description of these collieries and their output is found in the report of the Inspector, which follows.

CROW'S NEST PASS COLLIERIES.

These collieries, as will be seen from the statistics, made a largely increased output during the year. Nearly half of this output was converted into coke and sold as such. The market for the product of these collieries is unlimited, and, with further development and improved transportation facilities, the increase in output should be very large.

The following table shows the production of coal and coke by British Columbia collieries and the distribution of the output, together with the number of men employed and the wages paid for each class of labour, etc.:—

COAL AND COKE PRODUCED, EXPORTED, ETC.

SALES AND OUTPUT FOR YEAR.	COAL.				COKE.			
(Tons of 2,240 lbs.)	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.
Sold for consumption in Canada	413,704	18			80,154			
" export to U. S.	895,197	10			47,379			
" " to other Countries.....	18,965	15			....			
Total Sales..	....	....	1,327,868	03			127,533	—
Used under Colliery Boilers, &c.......	154,735	01	154,735	01				
			1,482,603	04				
Stocks on hand first of year...........	27,977	01			3,316			
" last of year	5,704	17			2,864			
Difference taken from Stock during year	....	...	22,272	04			452	—
Output of Collieries for year..	....	....	1,460,331	00			127,081	—

N.B.—The amount of coal used in making coke was 231,226 tons, which is not included in total coal output given.

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, &C.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. Employed.	Average Daily Wage.	No. Employed.	Average Daily Wage.	No. Employed.	Average Daily Wage.
Supervision and Clerical Assistance	47	$4 65	40	$4 00	87	$4 32
Whites—Miners	1,739	4 00	....	....	1,739	4 00
Miners' Helpers	327	2 40	....	....	327	2 40
Labourers	602	2 65	213	2 50	815	2 60
Mechanics and Skilled Labour	64	2 85	215	3 15	279	3 00
Boys	132	1 50	22	1 15	154	1 30
Japanese	28	1 40	36	1 15	64	1 30
Chinese	102	1 35	407	1 20	509	1 30
Indians	....	....	....	....	....	....
Totals	3,041	....	931	....	3,974	

REPORT ON THE INSPECTION OF CROW'S NEST COLLIERIES.

BY ARCHIBALD DICK, INSPECTOR.

I have the honour to submit my annual report on the inspection of the Crow's Nest Pass collieries, together with the official returns from the Crow's Nest Pass Coal Co.

The above company has now extensive collieries, and the output of coal and coke shows a considerable increase over the past year. The total coal produced from the Crow's Nest Pass collieries during 1901 was 379,355 tons, an increase over the year 1900 of 172,552 tons. Of this coal, 180,768 tons was converted into coke, producing 111,683 tons, as compared with 65,915 tons in the previous year, an increase of 45,768 tons. Of this coke, 32,121 tons was sold in the United States and 77,241 tons was sold for consumption in Canada.

The following are the official returns :—

COAL MINES REGULATION ACT.

Returns for the year ending December 31st, 1901, from MICHEL COLLIERY, MICHEL TOWN, SOUTH-EAST KOOTENAY DISTRICT.

Operated by THE CROW'S NEST PASS COAL CO., LTD, ; head office at Toronto.

OFFICERS.	ADDRESS.
Hon. Geo. A. Cox, President,	Toronto, Ont.
Robert Jaffray, Vice-President,	"
E. R. Wood, Secretary-Treasurer,	"
Thos. R. Stockett, Jr., General Superintendent,	Fernie, B. C.

Capital of Company, $2,500,000.

SALES AND OUTPUT FOR YEAR.	COAL.				COKE.			
(Tons of 2,240 lbs.)	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.
Sold for consumption in Canada	6,239	—						
〃 export to U. S	7,724	—						
〃 〃 to other Countries	....	....						
Total Sales	....	....	13,963	—				
Used in making Coke	32,147	—						
〃 under Colliery Boilers, &c	1,000	—						
Total for Colliery Use	....	....	33,147	—				
Output of Colliery for Year	....	....	47,110	—				

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, &c.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. Employed.	Average Daily Wage.	No. Employed.	Average Daily Wage.	No. Employed.	Average Daily Wage.
Supervision and Clerical Assistance	2	$5 50	4	$3 00	6	....
Whites—Miners	80	4 00	....	....	80	....
Miners' Helpers	....	....	....	....	....	....
Labourers	32	2 75	33	2 25	65	....
Mechanics and Skilled Labour	3	3 00	15	3 00	18	....
Boys	....	....	....	....	....	....
Japanese	....	....	....	....	....	....
Chinese	....	....	....	....	....	....
Indians	....	....	....	....	....	....
Totals	117	....	52	....	169	....

THE CROW'S NEST PASS COAL CO., LTD.,
THOS. R. STOCKETT, JR.,
General Superintendent.

The Minister of Mines is hereby authorised to publish these Returns.

THE CROW'S NEST PASS COAL CO., LTD.,
THOS. R. STOCKETT, JR.,
General Superintendent.

Returns for the year ending December 31st, 1901, from COAL CREEK COLLIERY, SOUTH-EAST KOOTENAY DISTRICT.

Operated by THE CROW'S NEST PASS COAL CO., LTD.; head office at Toronto, Ont.

OFFICERS.	ADDRESS.
Hon. Geo. A. Cox, President,	Toronto, Ont.
Robert Jaffray, Vice-President,	"
E. R. Wood, Secretary-Treasurer,	"
Thos. R. Stockett, Jr., General Superintendent,	Fernie, B. C.

Capital of Company, $2,500,000.

SALES AND OUTPUT FOR YEAR.	COAL.				COKE.			
(Tons of 2,240 lbs.)	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.
Sold for consumption in Canada	115,406	—	...	...	77,241	—		
″ export to U. S.	65,138	—	...	...	32,121	—		
″ ″ to other countries	...	...	...	...	...	...		
Total Sales	...	...	180,544	—	...	...	109,362	—
Used in making Coke	148,621	—						
″ under Colliery Boilers, &c	3,080	—						
Total for Colliery Use	...	...	151,701	—				
Stocks on hand first of year	...	...	...	...	357	—		
″ last of year	...	...	...	...	2,678	—		
Difference taken from Stock during year	...	...	...	...	...	...	2,321	—
Output of Colliery for Year	...	...	322,245	—	...	...	111,683	—

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, &C.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. Employed.	Average Daily Wage.	No. Employed.	Average Daily Wage.	No. Employed.	Average Daily Wage.
Supervision and Clerical Assistance	5	$5 50	7	$3 00	12	...
Whites—Miners	434	4 00	...	...	434	...
Miners' Helpers	...	...	...	...	...	...
Labourers	172	2 75	89	2 25	261	...
Mechanics and Skilled Labour	31	2 75	46	3 00	77	...
Boys	28	1 00	8	1 00	36	...
Japanese	...	...	...	...	...	...
Chinese	...	...	...	...	...	...
Indians	...	...	...	...	...	...
Totals	670	...	150	...	820	...

THE CROW'S NEST PASS COAL CO., LTD.,
THOS. R. STOCKETT, JR.,
General Superintendent.

The Minister of Mines is hereby authorised to publish these Returns.

THE CROW'S NEST PASS COAL CO., LTD.,
THOS. R. STOCKETT, JR.,
General Superintendent.

COAL CREEK COLLIERIES.

The Coal Creek collieries of the Crow's Nest Pass Coal Co., or what are better known as the Fernie mines, are about five miles from the main line of the Canadian Pacific Crow's Nest Pass Railway, and are called the No. 1, 2 and 3 tunnels.

No. 1 Tunnel.

This tunnel is driven into the mountain on the left side of Coal creek going up. The coal is hauled out by electric motors to the tipplers. I have been in this mine at least once every month during the past year. Many improvements have been made in and about the works, and the safety of the workmen is well provided for. On December 13th, 1901, I went into the above tunnel, which is worked on the separate split system, and is known as the east and west side. I first went into the west side and passed through the old works to the coal face, where mining was in progress. I went into all the working places and saw that they were in good order, well timbered and bratticed up near to the coal face. In some places the roof is very loose and is full of slips, which makes it very dangerous, but it is well attended to and, as I have said, is well timbered. The coal here varies in thickness from 5 to 14 feet.

The ventilation is good, and when I was last down, on the date mentioned, I saw by my instrument that there were 12,000 cubic feet of air passing per minute for the use of 50 men. This was near to the face. There is now very little gas seen in this district and all the men work with open lights.

I then entered what is known as the East district, going into the working faces by the way of the old works. I examined these with a safety lamp but did not find any gas. The roof was very hard. I went into all the working places and the airway, until I got to what is known as the "hoist incline," and I then went into all the works to the left of the hoist going down. Here the roof was very loose, requiring much timber, which was in many places close to the coal face, and well put in. All the men in this east division work by the light of locked safety lamps. I examined all the mine and, with the exception of one place where a canvas door had been broken down by a horse, I did not find any gas, although this district gives off a great deal, which is carried away direct to the fan tunnel. The ventilation is good, 12,000 cubic feet of air passing per minute near the face where the men work. The east as well as the west district is free from dust, being damp throughout, and in some places even very wet. This colliery was at one time very dry but now there is no dust, as the moisture of the mine has entirely overcome it.

On the intake or main tunnel I saw that there were 50,000 cubic feet of air passing in per minute, while there are only 24,000 feet accounted for, thus leaving 26,000 to escape. This 26,000 cubic feet gets chiefly into the old works, and is the means of keeping them clear of any standing gas. It will be understood that there are two tunnels into the workings here, one being the main tunnel where the coal is brought out, and which was driven and connected during the past year, and which is also the intake for ventilation, the other tunnel, which is quite a distance off, being the return for the air current, and at the entrance of this there is a large ventilating fan. Here the men could find an exit in case of necessity.

No. 2 Tunnel.

This No. 2 tunnel goes under the mountain on the opposite side of the creek from No. 1. The coal from both places is tipped into the railway cars by the same tippler. This mine is also worked on the separate split system, and is known as the Right, Left and High Level districts. When in this mine in December I had not gone far before I got into the old works of what is known as the Right district. I travelled in these old works to see if there was any accumulation of standing gas, and examined them with a safety lamp, but could not find any. I saw that there was quite a strong current of air travelling. I entered all the stalls at the face, where the men were working, and saw that they were in good order, well timbered and with brattice close up. In most of the places in this district the roof was very bad. The ventilation here was very good, and near to the face there were 12,600 cubic feet of air passing per minute for the use of 28 men. All the men were working by the light of locked safety lamps. I examined all the works but failed to find a trace of gas.

I went also through the Left Division of No. 2 mine, both the old and present working places, examining them with my safety lamp. At no place could I detect gas. All the men here were working by the light of locked safety lamps. Much of the roof here is treacherous, being full of slips, so that great care has to be taken and timber put in as soon as there is space for it. The safety of the mine is well looked after and everything is in good order.

The ventilation was good, 14,400 cubic feet of air passing per minute in the cross-cut nearest the face. The brattice was up as near to the face as it was possible to have it. In this division there were 44 men. The mine until lately was very dry, but now there is not any dust, the works being wet throughout.

The High Line Division is also in the No. 2 tunnel. There is not much old working as this is a new district where there are only a few men, all of whom had safety lamps. I did not find any gas, nor did any show in my lamp. All the places were well timbered with brattice close up. The ventilation was good here and I saw that there were 10,800 cubic feet of air passing per minute for only 14 men. In the main intake I saw that there were 78,900 cubic feet of air passing in the mine per minute, so that you will see that there are only 37,800 cubic feet of air accounted for, the 41,100 feet escaping at the doors and stopings, and finding its way into the old workings, keeping them clear of any standing gas. This, I think, is about one of the best safeguards in a mine which gives off gas, viz., to have a strong current of air passing through the old works as well as at the face.

NO. 3 TUNNEL.

This mine also belongs to the Crow's Nest Pass Coal Company, and is entered only a few yards to the east of the No. 2 mine, with which it is connected. This No. 3 may justly be called a slope, having a dip of a few degrees all the way to the bottom, where the levels branched off to both sides. This mine, as are all the mines here belonging to this company, is worked on the pillar and stall system. The coal is very good and is about 4½ feet thick, with a very hard rock for the roof. I have examined this mine, with all its workings, frequently during the past year, and it is in very good order, and is safe for the workmen. As I have said, the roof is very hard, but props are, nevertheless, put in as is usual. Ventilation is very good, and when I was down in December I saw that there were 32,500 cubic feet of air passing down the slope per minute, and this was well conducted into the face by brattice, etc., the total number of men employed here at one time being 40. Some of the men said that it was very cold, which I could fully believe, as I saw an icicle over twelve inches long hanging from the roof only a few yards from the coal face. There is little or no gas ever found in this mine, and, with the exception of shot lighters or firemen, they all work with open lights. There is not any dust in this mine as the floor is very wet.

As regards the ventilation in No. 2 and No. 3 mines, it was seen during the summer that something would have to be done to improve this, and after much consideration it was decided to put down a shaft of 100 square feet sectional area between the workings of these two properties, while at the same time the air-way was enlarged and a new twin Guibal fan, 16 feet in diameter and 8 feet wide, was ordered. The work was completed in October and the fan installed. It is worked by steam and is able to make 200 revolutions per minute; it is thus more than sufficient for the ventilation of Nos. 2 and 3 mines, giving a good supply of air at the face and a strong current in the old workings. At present the fan is only making 100 revolutions per minute, the amount of air passing in November being 105,000 cubic feet for 90 men, and in December, 1901, 111,400 cubic feet for 126 men and boys. The chief danger in mines which give off gas, as do these, lies in the old workings, but I cannot see that it is possible for any accident to occur from this source at these collieries. Every precaution is taken by the officials and if every person performs his allotted duty accidents should be avoided.

MICHEL COLLIERY.

Tunnel No. 4.

The Michel colliery lies in an easterly direction and about 26 miles from Fernie along the Crow's Nest Pass Railway (C. P. R.). The No. 4 mine is the property of the Crow's Nest Pass Coal Company, and is about 100 yards from the railway above mentioned, to which there is a siding for the coal cars. The vein now being worked here varies in thickness from 8 to 30 feet and is clean and of good quality. The mine is entered by a tunnel going under the mountain. After getting in about 300 feet it becomes a slope, which is now down about 600 feet. I examined this mine frequently during the past year and found that it has a very bad roof over the coal in most places, and also that it gives off much gas. The slope above mentioned is now down to what is known as the No. 9 level. In this level they are much troubled with gas, so that great care has to be taken, the roof being soft, to have the brattice kept well up. Men are kept constantly on the watch. Ventilation is good but rock falls out sometimes, making large holes in the roof, and this is where the gas collects. When I was down in November I saw that there was gas in No. 9 level, and the three stalls nearest the face also had gas in them, owing to the air-way having got blocked. The men were all brought out and the air-way so fixed that the gas was cleared out in a short time, all the men going back to work again. No gas was found in any of the other parts of the works.

In some places the roof under the timber is all lined with canvas, so that the air may not escape, thus forming a canvas box roof and sides. When I was down in December I saw that there were 27,740 cubic feet of air passing per minute, for a total of 45 men, all of whom work with safety lamps. There has recently been a new fan put in operation, which gives good results.

Nos. 8 and 9 tunnels are in a long distance, but at present there is not any work being done, as it is intended to coke the coal when the ovens are ready.

MORRISSEY MINES.

This is a new work which is now being started about 14 miles by railway west of Fernie and is also owned by the Crow's Nest Pass Coal Company. The showing of coal here is excellent. The mine workings are driven into the mountain on the north side of Morrissey creek into the following seams, viz.:—

No. 1 seam—two tunnels in 80 feet each; coal, 12 feet thick.
No 2 seam—one tunnel in 180 feet; coal, 30 feet thick.
No. 3 seam—one tunnel in 220 feet; coal, 4½ feet thick.
No. 4 seam—one tunnel 220, and counter in 100 feet; coal, 16 feet thick.
No. 5 seam—three tunnels in 250, 120 and 120 feet; coal, 18 feet thick.

There are several other good seams of coal in this vicinity which have not yet been opened up. The coal is of excellent quality and great expectations are entertained for the future of the mine. It is expected that during the coming year a spur will be built from the Great Northern Railway to connect with this colliery.

COKE.

At Fernie a very extensive trade in coke is carried on, during the past year 111,683 tons having been made, all of which found a ready market in Kootenay and the United States, where it is in good demand. The coke was made in 300 ovens, and in order to supply the demand during the past year 102 new ovens have been built at Fernie, and 224 at Michel. In addition to the ovens now at Michel the foundations have been laid for 200 more, together with sidings, etc. At Morrissey preparations are also being made for a large number of coke ovens.

ACCIDENTS IN CROW'S NEST COLLIERIES.

It will be observed that of the 22 accidents reported in the Crow's Nest collieries (page 1221), nearly all occurred where the men were at work, and many of them could have been avoided if more caution had been used by those injured.

Three accidents proved fatal, one by a fall of rock, one by a car in the mine, and one by an explosion of gas. Inquests were held to investigate as to the cause of these fatal accidents, excepting the one by the car, and all the evidence taken is now filed in the office of the Attorney-General.

There were 19 serious and slight accidents reported during the year, as follows:—five men were burned by gas explosions; six were injured by mine cars; four by falls of rock; one by machinery; one by falling; one by a rope in the mine, and one while discharging lumber from a railway car. Some of these accidents were very slight, while others were serious and it was a long time before the injured could return to work.

I may say that the mines of the Crow's Nest Pass Coal Company, as regards safety, are in much better condition, both for ventilation and moisture in the mine, than I have ever seen them before; and with the present ventilating machinery, strict attention to air-ways and good discipline, as well as ordinary care in supporting the roof, even with a large increase in the number of men employed, I think we should have a considerable decrease in the casualties.

The following were the prosecutions under the "Coal Mines Regulation Act" during the past year, with the sentence in each case:—

John McDougal, firing a shot in Fernie mine, March 11th, fined $5 and costs.
E. Margo, smoking in Fernie mine, April 12th, dismissed.
A. Porter, smoking in Michel mine, June 5th, fined $5 and costs.
J. Crorash, smoking in Fernie mine, June 6th, seven days' imprisonment.
J. Urbam, smoking in Fernie mine, June 6th, five days' imprisonment.

John McDougal, as will be seen, is charged with firing a shot in a district where there are nothing but locked safety-lamps, and where there are shot-lighters both for that purpose and to examine all the surrounding works to see that everything is safe before a shot can be fired. The charges made against the others for smoking (tobacco and pipe) were also in mines where there are no naked lights but only locked safety lamps allowed.

The taking of the above cases before a magistrate has had a very salutary effect, more especially as it has been stated that the next offender will receive the full penalty of the law.

REPORT ON THE INSPECTION OF VANCOUVER ISLAND COAL MINES.

Thos. Morgan, Inspector of Vancouver Island Collieries.

I have the honour, as Inspector of Coal Mines for Vancouver Island, to make my annual report for the year 1901.

During the year 1901 the Vancouver Island coal mines yielded a total output of 1,312,202 tons of coal, as compared with 1,383,374$\frac{6}{20}$ tons which formed the output of 1900. A good demand for the produce of Vancouver Island collieries has prevailed during the past year, and the usual superior quality of bituminous coal has been supplied to the local and foreign markets.

The collieries operated in 1901 on Vancouver Island were the following:—

The Nanaimo Colliery, owned by the New Vancouver Coal Mining and Land Co., Ltd., consisting of No. 1 Shaft, Esplanade, in Nanaimo; Protection Island Shaft; No. 5 Shaft, Southfield; and Harewood Mine.

Wellington Colliery, in Cranberry District, comprising Nos. 1, 2 and 3 Slope Mines, and the Tunnel Mine (also known as the Extension Mines) which have been worked by the Wellington Colliery Company, Ltd.

Wellington Colliery, in Comox District, which includes No. 4 Slope Mine; and Nos. 5 and 6 Shafts; also operated by the Wellington Colliery Co., Ltd. Coke and bricks are manufactured in connection with this colliery at Union Bay.

The Alexandria Colliery, in Cranberry District, worked by slope, by the Wellington Colliery Co., Ltd.

The general statistics of the Vancouver Island coal industry for 1901 are as follows, viz.:—

Aggregate Summary of Returns from Vancouver Island Collieries for the Year 1901.

Tons of 2,240 lbs.	Tons, Coal.	cwt.	Tons, Coal.	cwt.
Sold for consumption in Canada	292,059	18		
〃 export to other Countries	18,965	15		
〃 〃 United States	822,335	10		
Total sales			1,133,361	3
Used in making Coke	50,458	—		
〃 under Colliery Boilers	150,655	—		
Total for Colliery use			201,113	1
			1,334,474	4
Stock on hand first of year	27,977	1		
〃 last of year	5,704	17		
Difference taken from stock during year			22,272	4
Output of Collieries for year 1901			1,312,202	—

Coke sold for consumption in Canada		2,913	tons.
〃 〃 export to United States		15,258	〃
Total sales		18,171	〃
Stock on hand first of year	2,959		
〃 last of year	186		
Difference taken from stock during year		2,773	〃
Output of Coke at Wellington Colliery (Comox)		15,398	〃

Number of Men Employed in Vancouver Island Collieries.

Character of Labour.	Number Employed.		Total Number Employed.
	Under Ground.	Surface.	
Supervision and clerical	40	29	69
Whites—Miners	1,225		1,225
Miners' helpers	327		327
Labourers	398	91	489
Mechanics and skilled labour	30	154	184
Boys	104	14	118
Japanese	28	36	64
Chinese	102	407	509
Totals	2,254	731	2,985

The exports of Vancouver Island coal were made to the State of California, principally through the ports of San Francisco and southern parts of the State, and also to the Hawaiian Islands and Alaska.

Coal for use as fuel was supplied to a large extent to the Australian, Japanese and Chinese mail steamers. Coke has been exported to San Francisco.

The following statement shows the relative position of British Columbia coal exports in the market of California.—

	1899.	1900.	1901.
	Tons.	Tons.	Tons.
British Columbia	623,133	766,917	710,330
Australia	139,333	178,563	175,959
English and Welsh	93,263	54,099	52,270
Eastern (Cumberland and Anthracite)	38,951	17,319	27,370
Seattle (Washington)	271,694	250,590	240,574
Tacoma "	355,756	418,052	433,817
Mount Diablo, Coos Bay and Tesla	189,507	160,915	143,318
Japan and Rocky Mountains (by rail)	28,390	42,673	51,147
Total	1,740,027	1,889,128	1,834,785

Accidents.

I regret to have the painful duty of reporting the occurrence of 99 fatalities, as well as 46 injuries of a serious and slight character, in the Vancouver Island coal mines, during the year 1901. The increased number of fatalities this year was owing to three extensive disasters. At No. 6 shaft mine of Union Colliery, 64 men perished in an explosion from a cause which could not be determined, although an exhaustive inquiry was held, at which all available scientific opinion and evidence of the facts were adduced (the stenographer's notes of the inquiry are filed in the Department of the Hon. Attorney-General).

In No. 4 slope mine of the Union Colliery a fire caused the death of three men (a pump-man and two track-layers) before the morning shift went down. The fire could not be overcome without flooding the lower parts of the mine, and this was accordingly done. Until the water is pumped out an examination cannot be made.

The other extensive fatal accident by fire resulted in the entombment of 16 men in No. 2 slope mine of Wellington (Extension) Colliery in spite of all efforts to rescue them. The fire is supposed to have been started by the ignition of a curtain. When the fire has been extinguished a thorough investigation will be held. The above disasters caused 83 deaths.

Referring more particularly to the sad accident in No. 2 slope mine (Extension) which also involved No. 3 slope mine, as the two mines are connected, I may state for your information that in the course of the best preliminary inquiry which I have been able to make, with the assistance of the mine officials, it appears that about noon on 30th September, John Thomas, a young man employed as rope-rider, was at work in the No. 2 slope, conducting the regular trips of full cars from the different levels down the slope to the sidings in No. 4 east level, leading to the outlet of the tunnel, along which the coal is hauled out to the surface, the rope-rider returning up the slope with a trip of empty cars. Thomas states that while waiting on the slope two timber-men, named Southcombe and Griffiths, came up and told him to run, as the slope was on fire. He and the timber-men started running up through the suffocating heat and smoke, but only Thomas reached the top. No other person came out by way of the mouth of the slope, up which fire was being drawn by the ventilating fan, owing to the burning of the canvas curtains across the slope. Southcombe and Griffiths probably succumbed in the smoke. The workmen who escaped from the workings to the rise of No. 2 east level, travelled by way of the air-course of No. 2 east level and along an air-way to No. 3 level and thence down to No. 4 level and out by way of the tunnel. In the mine plan annexed to this report, the course which was taken by those who escaped from No. 2 level workings is approximately indicated by a red dotted line against the air. Unfortunately, however, 13 men who were working in places off the same No. 2 level lost their lives. It is believed that by travelling along the No. 2 level to reach the slope, and encountering the heavy smoke, they were suffocated. The way taken by those workmen (instead of the safe one adopted by their comrades) is shown on the plan by a blue dotted line. Another man, who was working at the back of No. 1 level, had no chance to save himself, owing to the dense smoke proceeding from the fire. Only when the mine can be entered again will further information be obtained.

Of the remaining 16 fatal accidents, 5 were occasioned by falls of rock and 6 by falls of coal upon men in their working places, where the workmen were themselves responsible for their own safety. One fatality by gas explosion was caused by the deceased himself, who was a fireman. Two deaths, of a driver and pusher, by mine cars, were both unavoidable accidents; and there were two fatal shaft accidents, to a cager and a pit-head man, where no one was blameable. Of the serious accidents, 2 were from gas explosion, which happened to a colliery superintendent and his son while they were surveying an idle mine and unguardedly using a naked light. Two were caused by mine cars; four were from careless handling of powder in the mine; two from timber and rope; and two on the surface mine railway. Slight injuries were suffered by 19 men, of whom seven were slightly burned by gas through their own negligence; two were by falls of coal and two by falls of rock in working places; two by mine cars and six by negligent use of powder. Particulars of all accidents appear in the detailed statement of accidents accompanying this report, and the fullest inquiry was made into every case either by coroner's inquest or minute investigation by myself, and the causes of the accidents were ascertained as far as possible and such measures as appeared to be called for, in order to secure the prevention of a recurrence of the casualties, were taken by me, so far as the Coal Mines Regulation Act gave me power. Regular monthly examinations have been made by me, of the mines of the collieries in Nanaimo, Comox, Cranberry and Douglas districts, as required by the Coal Mines Regulation Act, and I have made special examinations whenever necessary. I have, to the best of my ability, seen that the Act and its rules and regulations were duly observed by managers, officials and workmen alike.

NANAIMO COLLIERY.

The following are the official returns from this colliery for the year 1901 :—

COAL MINES REGULATION ACT.

Returns for the year ending December 31st, 1901, from NANAIMO COLLIERY, NANAIMO TOWN AND DISTRICT.

Operated by THE NEW VANCOUVER COAL MINING & LAND CO., LTD. ; head office at London, England.

OFFICERS.	ADDRESS.
J. Galsworthy, Esq., Chairman,	12, Old Jewry Chambers, Old Jewry, London, E. C.
Joseph Ramsden, Esq., Secretary,	" " "
Samuel M. Robins, Esq., Superintendent, Nanaimo, B. C.	

Capital of Company, $1,075,000 ; debenture capital, $110,000 ;
Value of Plant, $350,000.

SALES AND OUTPUT FOR YEAR.	COAL.				COKE.			
(Tons of 2,240 lbs.)	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.
Sold for consumption in Canada	65,095	12						
" export to U. S.	424,234	—						
" " to other Countries	18,404	15						
Total Sales	....	....	507,734	7				
Used in making Coke	....	....						
" under Colliery Boilers, &c	85,874	3						
	....	....	85,874	3				
Total for Colliery Use	....	....	593,608	10				
Stocks on hand first of year	13,984	1						
" last of year	4,701	17						
Difference taken from stock during year	....	....	9,282	4				
Output of Colliery for Year	....	....	584,326	6				

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, &C.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. Employed.	Average Daily Wage.	No. Employed.	Average Daily Wage.	No. Employed.	Average Daily Wage.
Supervision and Clerical Assistance	19	....	13	....	32	....
Whites—Miners	502	$3.00 to $5.00	....	....	502	....
Miners' Helpers	....	....	....	....	....	....
Labourers	263	2.60 to 3.00	34	$2.50	297	....
Mechanics & Skilled Labour	....	....	74	$3.00 to $4.00	74	....
Boys	69	1.00 to 2.00	3	1.00 to 1.50	72	....
Japanese	....	....	....	....	....	....
Chinese	....	....	148	1.12½ to 1.50	148	....
Indians	....	....	....	....	....	....
Totals	853	....	272	....	1,125	....

Names of seams or pits—Southfield No. 2, Southfield No. 5, No. 1 Esplanade Shaft, No. 1 Northfield Shaft, Protection Island Shaft, Upper and Lower Seams, Newcastle Shaft, Harewood Slope and Harewood shaft.

Description of seams, tunnels, levels, shafts, etc., and number of same—Southfield No. 2, worked by slope; seam 6 to 10 feet. Southfield No. 5, worked by shaft; seam 5 to 10 feet. No. 1 Northfield Shaft, worked by shaft; seam 2 to 3½ feet. Protection Island Shaft, worked by shaft; lower seam 3½ feet, upper seam 5 feet. No. 1 Shaft, worked by shaft; seam 3 to 12 feet. Harewood Slope, worked by level; seam 6 feet. Harewood shaft, worked by shaft, seam 5 feet.

Description and length of tramway, plant, etc.—Eight miles of railway, ordinary gauge (4 feet 8½ inches), with bunkers and wharves, connecting all the collieries with Nanaimo harbour; engines (hauling, pumping, electric and air compressing); locomotives, rolling stock, etc., etc.

New Vancouver Coal Mining & Land Co., Limited,
Samuel M. Robins, *Superintendent.*

The Minister of Mines is hereby authorised to publish these returns.

New Vancouver Coal Mining & Land Co., Limited,
Samuel M. Robins, *Superintendent.*

COAL MINES OF THE NEW VANCOUVER COAL MINING AND LAND COMPANY, LIMITED.

The New Vancouver Coal Mining and Land Company, Limited, has been working its coal mines at the Nanaimo colliery during the year 1901, under the superintendence of Mr. Samuel M. Robins, J. P., and the management of Mr. Thomas Russell, M. E. The workings are as follows:—

No. 1 Shaft, Esplanade in Nanaimo, Joseph Randle, Overman.
Protection Island Shaft, Thomas Mills, "
No. 5 Shaft, Southfield, Richard Gibson, "
Harewood Mine (near Extension Mine), George Bradshaw, "
The Northfield Mine, near Wellington, is still idle.

Descriptions of the above-named mines appeared in the mining reports for 1898 and (as to Harewood) 1900. Such workings as have been added and any important alterations in the works are noted in the following report.

No. 1 Shaft, Esplanade, Nanaimo.

The Diagonal slope (to the south-east of the main slope) has been extended to 1,000 yards; new levels have been started (well down the slope) to north and south, in good coal. The work is all pillar and stall in the district of the Diagonal, and No. 1 shaft is the intake. At the test made in December there were 37,200 cubic feet of air passing per minute for 46 men and 10 mules on a shift, a full supply. In No. 3 north level district, about 1,000 yards in the level, the slope, which is to the dip there, has been driven 250 yards further, and is in good coal, with stalls laid off in good coal. No. 1 shaft is also the intake of this district and when last tested 20,000 cubic feet of air per minute were supplied to 22 men and 4 mules on a shift, and some miners working down the slope had the advantage of this air.

An electric winch is stationed at the head of the slope off No. 3 level, and an additional winch (worked by compressed air) has been placed in the Diagonal.

On the north side of Lamb's incline, where pillars are being extracted, the workings received 8,400 cubic feet of air per minute for 11 men and 3 mules per shift, being a separate split. The south side workings of Lamb's incline are worked by pillar and stall, and are also a separate split: they were supplied with 40,350 cubic feet of air per minute for 65 men and 10 mules per shift. The district of the Big incline received 6,600 cubic feet of air per minute for 27 men and 6 mules per shift; the workings are by pillar and stall and the extraction of pillars on the south side.

The intake for No. 1 north level is Protection shaft, and the upcast for Lamb's incline is the new shaft at Newcastle island. The return for the Big incline is the ventilating fan at No. 1 shaft, Esplanade.

PROTECTION ISLAND SHAFT.

Upper Seam.

In the upper seam mining by pillar and stall and pillar work has been going on during the year. In the main slope district there were 22,440 cubic feet of air per minute supplied for 45 men and 2 mules per shift. The diagonal slope received 15,840 cubic feet of air per minute for six men.

Lower Seam.

A slope has been driven back from No. 3 level to meet the lower seam of coal, which was reached in a short distance. The workings in the lower seam are by long-wall, the mining and drilling being done by machinery, which is driven by compressed air. The coal raised is of a superior quality; it is hauled up the slope by a hoisting winch, driven by compressed air, to the No. 3 level, and when arrangements are completed will be taken out through No. 1 shaft on the Esplanade.

When the air was taken 5,850 cubic feet passed per minute for the use of 12 men and 1 mule. The total air descending Protection and No. 1 shafts was 190,750 cubic feet per minute, of which 48,750 cubic feet ascended Newcastle shaft, and 144,000 cubic feet up No. 2 (upcast) shaft on the Esplanade. The total air supplied to the workmen was 156,680 cubic feet in Protection and No. 1 shaft mines, which left 36,070 cubic feet of leakage for the mule stables and the old workings.

No. 5 SHAFT, SOUTHFIELD.

The work in this mine has been chiefly extraction of pillars, but some pillar and stall work was also done. On the east side, on making a test, I found 20,020 cubic feet of air per minute supplied to 12 men and 2 horses. Up the heading there were 21,000 cubic feet of air per minute for 43 men and 8 horses. The total air at the return shaft was 55,000 cubic feet, showing a good allowance of air for old workings, etc. The trouble formerly experienced from black damp arising in this mine has ceased.

HAREWOOD MINE.

The slope is down 650 yards, and is within a short distance of making connection with a new shaft sunk to the dip of the seam. The shaft is 232 feet in depth, size 8 feet by 16 feet, timbered from top to bottom. There is a substantial pit-head frame, 65 feet in height, with landing stage 30 feet high, size 32 feet by 100 feet. Hoisting is done by a double engine with 16-inch cylinders, 36-inch stroke, drum 7 feet in diameter. Steam is supplied by 2 double-flue boilers 25 feet by 4 feet 6 inches. The screening will be effected by shaking screens with travelling picking table 4 feet by 45 feet, moved by creeper chains; motive power, a steam engine. A new railway of standard gauge, 3½ miles long, connects the mine with the Nanaimo shipping wharves. The workings of the mine are by level, and by pillar and stall The air test showed 7,200 cubic feet of air per minute, passing for the use of the workmen employed—an ample supply.

COAL MINES OF THE WELLINGTON COLLIERY CO., LIMITED.

The Wellington Colliery Company, Ltd., has been operating the following mines during the year 1901, under the general management of Francis D. Little, M. E.:

The Wellington Colliery, in Comox District; John Matthews, M. E., Manager.

The Alexandria Colliery, Cranberry District; John Kisby, M. E., Manager.

The Wellington Colliery, Cranberry District; Andrew Bryden, M. E., Manager.

The works of these collieries were described in detail in the Mining Report of 1898, and any additions are noted in subsequent Reports.

WELLINGTON COLLIERY.

The following are the official returns of this colliery for the year 1901:—

Coal Mines Regulation Act.

Returns for year ending December 31st, 1901, from Wellington Colliery, Cumberland Town, Comox District.

Operated by Wellington Colliery Co., Limited: head office at Victoria, B. C.

Officers.	Address.
James Dunsmuir, President,	Victoria, B. C.
F. D. Little, V.-President,	Ladysmith, B. C.
C. E. Pooley, Secretary,	Victoria, B. C.
R. W. Dunsmuir, Treasurer,	"
F. D. Little, Superintendent,	Ladysmith, B. C.

Capital of Company, $2,000,000; value of plant, $150,000.

Sales and Output for Year.	Coal.				Coke.			
(Tons of 2,240 lbs.)	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.
Sold for consumption in Canada	99,259	—			2,913	—		
" export to U. S.	103,728	—			15,258	—		
" " to other countries	....	....			....	....		
Total Sales	....	....	202,987	—	....	....	18,171	—
Used in making Coke	27,351	—						
" under Colliery Boilers, &c.	35,920	—						
Total for Colliery Use	....	....	63,271	—				
			266,258	—				
Stocks on hand first of year	13,793	—	....	....	2,959	—		
" last of year	1,003	—	....	....	186	—	2,773	—
Difference taken from Stock during year	....	....	12,790	—				
Output of Colliery for year	....	....	253,468	—			16,398	—

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, &c.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. Employed.	Average Daily Wage.	No. Employed.	Average Daily Wage.	No. Employed.	Average Daily Wage.
Supervision and Clerical Assistance	16	$3 to $5	6	$3 to $6	22	
Whites—Miners	235	3 to 5	....	....	235	
Miners' Helpers	171	$1.50 to 2.50	....	....	171	
Labourers	52	2.50 to 2.75	43	$2.50 to $2.75	95	
Mechanics and Skilled Labour	15	2.75 to 3.00	34	$3 to $3.50	49	
Boys	8	1.50 to 2.00	11	$1 00	19	
Japanese	28	1.25 to 1.50	34	$1 00	62	
Chinese	102	1.25 to 1.50	126	$1 to $1.25	228	
Indians	....	....	....	....	....	
Totals	627	....	254	....	881	....

Name of Seams or Pits—No. 4 Slope, No. 5 Shaft, No. 6 Shaft.

Description of seams, tunnels, levels, shafts, &c., and number of same—No. 4 Slope with air-ways and levels; No. 5 Shaft with air-ways and levels; No. 6 Shaft with air-ways and levels.

Description and length of tramway, plant, &c.—12 miles, 4 feet 8½ inches gauge; 4 locomotives, 150 coal cars (22 tons each), 1 second-hand passenger car, 1 combination passenger car; 1 diamond drill, 2 stationary engines, 5 steam pumps, 5 electric pumps, 1 dynamo, 1 steam saw-mill, 1 Luhrig coal washer, 200 coke ovens (bee-hive pattern), 2 wharves, and 1 pile-driver.

JAMES DUNSMUIR,
President.

The Minister of Mines is hereby authorised to publish these returns.

JAMES DUNSMUIR.

NO. 4 SLOPE (WELLINGTON), COMOX.

Richard Short, Overman.

In the main diagonal or East Slope District, the Nos. 13, 14 and 15 levels have been extended during the year, and No. 16 level has been started. Work is by pillar and stall, in good coal, but on the west side pillars have been extracted.

In the Old Slope District progress has been made with the levels, and extensive pillar and stall work in good coal has also been going on during the year.

The diagonal slope has been driven some distance, and the levels have been extended.

In all the districts an ample supply of air was furnished for the use of the workmen at the time of my inspection made on the 25th July, 1901.

I regret to report that on 30th July a fire broke out at No. 9 level pump station which baffled the efforts made to extinguish it and obliged the management to flood the mine.

When the water was up to No. 7 level there were no signs of the fire. Work was started from No. 6 level upwards, on the right of the east slope, by pillar and stall, and the air supplied to the workmen for this separate split was 25,200 cubic feet per minute for 45 men and 3 mules.

Work was also commenced on the left side of the old slope, from No. 6 level upwards, by pillar and stall. The air passing in this split for use of 30 men and 2 mules was 24,000 cubic feet per minute.

A pair of new hoisting engines of great power, 24 x 36, first motion, with four 6-foot drums in tandem, tail-rope drums in front, hauling-rope drum behind, have been installed at the head of No. 4 slope. This engine is stationed on a massive foundation of stone work in a new engine house. Four new flue boilers complete a battery of 12 boilers, and eight large electric pumps, which are now in place, will be operated by the dynamo in the power-house, reinforced by a new dynamo, thus aggregating 300 horse-power, for the purpose of rapidly pumping the water out of the mine.

No. 5 Shaft (Wellington), Comox.

David Walker, Overman.

Nos. 1 and 2 west levels have been going forward most of the year in good coal. Work is by pillar and stall. Air for the district of these two levels was 36,000 cubic feet per minute for 31 men and 3 mules. In the heading (going south towards No. 6 shaft) the work is longwall in good coal. In making a test of the air, I found 15,000 cubic feet passing per minute for 65 men and 5 mules.

The total air taken at the ventilating fan shaft was 78,000 cubic feet per minute, which shows a leakage of 27,000 cubic feet going through the old workings, etc. Owing to the explosion which occurred in No. 6 shaft, it became necessary to close down No. 5 shaft while repairs were being effected.

No. 6 Shaft, (Wellington).

Wm. Johnston, Overman.

On the 15th of February a most deplorable explosion happened in this shaft, which, besides causing serious loss of life, wrecked the mine generally. In August the needed repairs had been made and the mine was again working.

In No. 2 Incline District, where work is by pillar and stall, on my inspection in August I found 13,500 cubic feet of air per minute passing for 7 men and a mule.

On the east side of No. 3 incline, which is a separate split, there were 7,960 cubic feet of air per minute for 16 men and a mule.

On the west side of No. 3 incline there were 14,400 cubic feet per minute for 23 men and 3 mules. The work of these two districts is done by longwall.

No. 7 Shaft (Wellington), Comox.

A tunnel is being driven from a ravine to drain the surface water to the bedrock of the site for a new shaft, about 500 yards to the dip of the seam worked in Nos. 4 and 5 slope mines.

A railway, two miles long, of standard gauge, is being constructed from No. 5 mine to the site of No. 7, of a good grade—1 per cent. in favour of the load.

Coke.

Coal washing and coke making is carried on by the Wellington Colliery Company, Ltd., at the Company's extensive works and coke ovens at Union Bay, the shipping point of the Union Colliery.

ALEXANDRIA COLLIERY.

The following are the official returns of this colliery for the year 1901 :—

COAL MINES REGULATION ACT.

Returns for year ending December 31st, 1901, from ALEXANDRIA COLLIERY, SOUTH WELLINGTON TOWN, SOUTH NANAIMO DISTRICT.

Operated by WELLINGTON COLLIERY CO., LTD.; head office at Victoria, B. C.

Alex. Faulds, Superintendent, South Wellington.

Value of plant, $20,000.

SALES AND OUTPUT FOR YEAR.	COAL.				COKE.			
(Tons of 2,240 lbs.)	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.
Sold for consumption in Canada	42,676	16						
" export to U. S.	16,945	—						
" " to other Countries	....	....						
Total Sales	....	....	59,621	16				
Used in making Coke at Comox	5,799	—						
" under Colliery Boilers, &c	3,200	—						
Total for Colliery Use	....	....	8,999	—				
			68,620	16				
Stocks on hand first of year	200	—						
" last of year	....	....						
Difference taken from Stock during year	....	....	200	—				
Output of Colliery for year	....	....	68,420	16				

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, &C.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. Employed.	Average Daily Wage.	No. Employed.	Average Daily Wage.	No. Employed.	Average Daily Wage.
Supervision and Clerical Assistance	1	$4 75	2	$2.50 to $6.50	3	$2.50 to $6.50
Whites—Miners	102	$3 to $5.50	....	....	102	3.00 to 5.50
Miners' Helpers	....	....	....	....	....	....
Labourers	83	2.25 to 2.50	4	2.50 to 2.75	87	2.25 to 2.75
Mechanics and Skilled Labour	5	2.50 to 3.00	9	2.50 to 3.00	14	2.50 to 3.00
Boys	5	1.00 to 2.00	....	....	5	1.00 to 2.00
Japanese	....	....	....	....	....	....
Chinese	....	....	28	1.00 to 1.50	28	1.00 to 1.50
Indians	....	....	....	....	....	....
Totals	196		43	....	239	

Name of Seams or Pits—Alexandria.

Description of seams, tunnels, levels, shafts, &c., and number of same—No. 1 Slope with airways and levels.

Description and length of tramway, plant, &c.—Hoisting engines and boilers; 1 mile of siding connecting with E. & N. Railway; "Sheppard" coal washer; fan and fan house; stables, etc.

JAMES DUNSMUIR.
President.

The Minister of Mines is hereby authorised to publish these returns.

JAMES DUNSMUIR.

The old south level has been going forward during the year. A No. 1 south level has been started about 400 yards down the main slope, and is in about 150 yards. A No. 3 south level, about 100 yards down the main slope from the old level, is, with its counter, in about 100 yards. This mine was idle during a large part of the year.

At my last inspection when the mine was working, there were 43,120 cubic feet of air per minute for 120 men and 11 mules; this air is divided into three splits.

A pair of new hoisting engines, 16 by 30, with 5-foot drum, have been placed at the slope head. The steam plant has been increased to six double-flue boilers.

WELLINGTON COLLIERY.

The following are the official returns of this colliery for the year 1901:—

COAL MINES REGULATION ACT.

Returns for year ending December 31st, 1901, from WELLINGTON COLLIERY, CRANBERRY DISTRICT.

Operated by WELLINGTON COLLIERY CO., LTD.; head office at Victoria, B. C.

Andrew Bryden, Manager, Wellington-Extension.

Value of plant, $200,000.

SALES AND OUTPUT FOR YEAR.	COAL.				COKE.			
(Tons of 2,240 lbs.)	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.
Sold for consumption in Canada	85,028	10						
〃 export to U. S.	277,428	10						
〃 〃 other countries	561	—						
Total Sales			363,018	—				
Used in making Coke at Comox	17,308	—						
〃 under Colliery Boilers, &c	25,660	18						
Total for Colliery Use			42,968	18				
			405,986	18				
Stocks on hand first of year								
〃 last of year								
Difference added to Stock during year								
Output of Colliery for year			405,986	18				

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, &c.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. Employed.	Average Daily Wage.	No. Employed.	Average Daily Wage.	No. Employed.	Average Daily Wage.
Supervision and Clerical Assistance	4	$8 00	....	....	12	....
Whites—Miners	386	$3 to $4.50	....	....	386	$3 to $4.50
Miners' Helpers	156	$2.50 to $3	....	....	156	$2.50 to $3
Labourers	....	....	10	$2 to $2.50	10	$2 to $2.50
Mechanics and Skilled Labour	10	$2.75 to $3	37	$2.50 to $4	47	$2.50 to $4
Boys	22	$1 to $2	....	....	22	$1 to $2.00
Japanese	....	....	2	$1 25	2	$1 25
Chinese	....	....	105	$1 to $1.50	105	$1 to $2.00
Indians	....	....	....	....	....	....
Totals	578	....	162	....	740	

Name of Seams or Pits—Wellington.

Description of seams, tunnels, levels, shafts, &c., and number of same—No. 1 Main Tunnel with air-ways and levels; No. 1 Slope with air-ways and levels; No. 2 Slope with air-ways and levels; No. 3 Slope with air-ways and levels.

Description and length of tramway, plant, &c.—5 miles railway with sidings; 4 locomotives; 200 Gondola coal cars, capacity 25 tons; 150 coal cars, capacity 3 tons; 4 stationary engines; electric power house with 2 generators; electric tramway with 2 locomotives; wharves and bunkers at Ladysmith, Oyster Harbour.

JAMES DUNSMUIR,
President.

The Minister of Mines is hereby authorised to publish these returns.

JAMES DUNSMUIR.

NO. 1 SLOPE, WELLINGTON COLLIERY, IN CRANBERRY DISTRICT.

The work in this mine is principally by extraction of pillars. At my test of the air in December, I found 36,000 cubic feet per minute passing for 37 men and 4 mules.

Two air compressors have been installed for service of pumps and winches in the mine.

NO. 2 SLOPE, WELLINGTON COLLIERY, IN CRANBERRY DISTRICT.

This mine is connected with No. 3 mine by No. 4 west level. The Nos. 1, 2, 3 and 4 east levels have been considerably advanced during the year in good coal. The coal is lowered from the workings to No. 4 east level, and taken thence by the electric motors out through the main tunnel.

Ventilation during the past year was combined with that of No. 3 mine, but will shortly be separated from it.

There were 91,000 cubic feet of air supplied for use of the workmen in this and No. 3 mine, this air being divided into splits for the different districts in both mines. There were about 70 men and 6 mules employed on a shift in this mine.

On the 30th of September a disastrous fire arose in this mine which resulted in serious loss of life and in the closing of the mine, and also of No. 3 mine, for the remainder of the year, as particularised in my report on the accidents.

No. 3 Slope, Wellington Colliery, in Cranberry District.

All the levels—Nos. 1, 2 and 3 east, and 1, 2, 3 and 4 west—of the main slope have been extended during the past year in excellent coal; about 60 men and 14 mules were working per shift, and were amply supplied with air from the quantity mentioned in my observations on No. 2 mine, served in separate splits to the different districts.

A new Guibal fan has been placed over the return air-way of the No. 3 slope, which will in the year 1902 provide separate ventilation for this mine. This mine has remained closed, together with No. 2 mine.

The Tunnel, Wellington Colliery, in Cranberry District.

From the east incline, No. 1 level and counter have been driven 700 yards. No. 2 level and counter have been driven 540 yards, and No. 3 level and counter 180 yards. These levels form a district worked partly by longwall and by pillar and stall. The air tested gave 33,300 cubic feet per minute for 63 men and 5 mules.

From the west incline, No. 2 level and counter have been driven 800 yards, and form a district where 13,340 cubic feet of air per minute pass for the use of 46 men and 5 mules.

No. 3 level and counter have been driven 600 yards; No. 4 level and counter, 500 yards. In the district of Nos. 3 and No. 4 levels 21,600 cubic feet of air per minute pass for the use of 47 men and 5 mules.

The workings of the west incline are by pillar and stall. The coal is run down the incline to the tunnel and taken out by electric motors. The drainage of the Nos. 2 and 3 and the Tunnel mines runs out through the tunnel, which is level free.

ACCIDENTS IN BRITISH COLUMBIA COLLIERIES DURING 1901.

Causes of Accidents and Nature of Injury.	Colliery at which Accident Occurred.															Total for 1901.			
	Nanaimo.			Union.			Alexandria.			Extension.			Crow's Nest.						
	Fatal.	Serious.	Slight.	Fatal.	Serious.	Slight.	Fatal.	Serious.	Slight.	Fatal.	Serious.	Slight.	Fatal.	Serious.	Slight.	Total.	Fatal.	Serious.	Slight.
Explosion of Gas																16			
Fatal										1			1				2		
Serious								2										2	
Slight			1			1						5			5				12
Explosion from causes undertermined				*64												64	64		
Fall of Coal																17			
Fatal										6							6		
Serious					4						5							9	
Slight						2													2
Fall of Rock																18			
Fatal	2			3									1				6		
Serious		3			1						2			2				8	
Slight						1			1						2				4
From Mine Cars																13			
Fatal										2			1				3		
Serious					1						1			3				5	
Slight												2			3				5
Powder in Mine																10			
Fatal																			
Serious					1						3							4	
Slight			1			3						2							6
Shaft																2			
Fatal	1			1													2		
Timber in Mine					1									1		2		2	
Railway Cars (Surface)					1											1		1	
Rope in Mine											1			1		2		2	
Locomotive (on Surface)					1											1		1	
Fire in Mine				3						16						19	19		
Miscellaneous															2	2			2
Total	3	3	2	71	10	7	..	2	1	25	12	9	3	7	12	167	102	34	31

* Verdict of jury at inquest was that the cause of the explosion at No. 6 Shaft, Union Mine, was not disclosed by the evidence adduced. The evidence exhausted the facts and expert opinions.

SUMMARY—TABLE SHEWING ACCIDENTS OCCURRING IN B. C. COLLIERIES IN TEN YEARS—1892 TO 1901.

For the year	1892.				1893.				1894.				1895.				1896.			
Output of coal—tons...	826,335.				978,294.				1,012,953.				939,654.				896,222.			
No. persons employed.	2,854				2,862				2,929				2,924				2,753			
Nature of Injury. Cause of Accident.	Fatal.	Serious.	Slight.	Total.	Fatal.	Serious.	Slight.	Total.	Fatal.	Serious.	Slight.	Total.	Fatal.	Serious.	Slight.	Total.	Fatal.	Serious.	Slight.	Total.
Explo'n (cause unknown)	..	..	..	..	..	..	..	..	.	.	..	..	..	..	..	..	..	..	..	..
Gas explosions	..	..	1	1	..	1	6	7	..	..	9	9	.	5	7	12	1	3	8	12
Falls of coal..........	1	6	3	10	5	7	1	13	2	7	..	9	1	4	..	5	3	4	1	8
" rock	2	6	2	10	6	6	1	13	..	8	..	8	5	13	..	18	2	8	.	10
Mine cars	2	4	..	6	1	10	.	11	..	4	1	5	2	9	..	11	1	8	..	9
" mules	..	3	..	3	..	1	..	1	..	..	..	..	..	..	..	..		2	..	2
" timber	..	2	..	2	..	..	..	..	1	..	..	1	..	..	..	..	..	..	..	..
Hoisting, ropes, &c	..	..	..	..	1	..	..	1	..	2	..	2	..	3	..	3	..	1	..	1
Powder, &c., explosions	..	7	..	7	..	3	..	3	..	..	..	..	..	..	..	..	..	1	..	1
Shot	.	3	2	5	1	..	.	1	1	1	1	3	2	3	.	5	..	2	..	2
On surface—miscellane's	1	1	.	2	2	1	..	3	..	..	..	..	..	2	..	2	2	..	..	2
Fire in Mine	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	6	32	8	46	16	29	8	53	4	22	11	37	10	39	7	56	9	29	9	47

For the year	1897.				1898.				1899.				1900.				1901.				Total for 10 years.			
Output of coal—tons...	882,854.				1,135,865.				1,306,324.				1,439,595.				1,460,331.				10,878,427.			
No. persons employed.	2,433				2,988				3,780				4,031				3,974				31,528			
Nature of Injury. Cause of Accident.	Fatal.	Serious.	Slight.	Total.	Fatal.	Serious.	Slight.	Total.	Fatal.	Serious.	Slight.	Total.	Fatal.	Serious.	Slight.	Total.	Fatal.	Serious.	Slight.	Total.	Fatal.	Serious.	Slight.	Total.
Explo'n (cause unknown)	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	64	..	..	64	64	...	...	64
Gas explosions	..	2	2	4	2	14	3	19	3	9	18	30	..	2	22	24	2	2	12	16	8	39	89	136
Falls of coal..........	1	3	2	6	3	4	.	7	1	4	3	8	2	14	3	19	6	9	2	17	20	65	19	104
" rock	2	7	2	11	1	5	3	9	3	5	4	12	6	15	3	24	6	8	4	18	35	85	21	141
Mine cars	3	4	..	7	1	9	3	13	3	9	4	16	4	7	3	14	3	5	5	13	20	81	17	118
" mules	..	1	..	1	..	2	..	2	..	..	..	..	..	..	..	..	...	..	..	...	...	10	...	10
" timber	..	2	..	2	..	..	..	..	..	..	..	..	..	1	1	2	...	2	..	2	1	7	1	9
Hoisting, ropes, &c	.	2	..	2	..	.	..	..	..	.	..	..	1	..	..	1	...	2	..	2	3	10	...	13
Powder, &c., explosions	..	..	..	..	..	3	1	4	..	2	1	3	1	3	3	7	..	4	6	10	1	18	12	31
Shot	..	..	..	..	..	..	..	..	..	..	..	..	.	.	3	3	...	..	..	...	5	12	6	23
On surface—miscellane's	..	..	..	..	..	2	.	2	1	..	.	1	3	1	.	4	2	2	2	6	12	10	2	24
Fire in Mine	..	..	..	..	..	.	..	..	..	..	..	..	..	..	.	..	19	..	..	19	19	...	...	19
	6	21	6	33	7	39	10	56	11	29	30	70	17	43	38	98	102	34	31	167	188	337	167	692

DETAILED STATEMENT OF ACCIDENTS IN B. C. COLLIERIES DURING 1901.

Reported by Thomas Morgan, Inspector V. I. Collieries.

No.	Colliery.	Date.	Name.	Occupation.	Remarks.
1	Union	Jan. 3rd	Ah Quong	Miner	Leg broken by the premature discharge of a shot in his stall in No. 6 Shaft, caused by cutting the squib short.
2	Alexandria....	″ 9th	Alex. Faulds..	Supt	Severely burnt by an explosion of gas, ignited by naked light, while surveying in the inside workings to the rise of the North Level, at a time when the mine was idle.
3	″	″ 9th	John Faulds ..	Helper	
4	Union	″ 15th	Lum Dub.....	Miner	Back broken by fall of coal after firing a shot in No. 6 Shaft.
5	″	″ 15th	Peter Bono....	″	Slightly injured about the neck by a fall of coal in No. 6 Shaft.
6	Extension.....	″ 18th	J. Blackstock .	Pusher	Slightly injured on the head by a runaway car in the tunnel.
7	″	″ 21st	C. Maggiorini .	″	Fatally injurd by a runaway car in No. 3 Slope.
8	Union	″ 26th	Wm. Anthony.	Fireman	Slightly burnt by gas in a pot-hole in the road, in No. 5 Shaft.
9	Extension.....	″ 28th	Joe Ontana....	Miner	Legs broken and head cut on the slope of No. 3 Mine, through draw-band breaking and part of a trip of cars running back.
10	″	″ 31st	James Hall....	″	Killed in his stall in No. 2 Slope through the top coal falling on him and smothering him. If he had spragged the top coal it would not have happened.
11	Union	″ 31st	John Chalmers.	″	Arm and both legs broken by a fall of top coal after a shot in No. 4 Slope, No. 15 east level.
12	Extension.....	″ 31st	Hy. McGregor.	Timberman . .	Leg broken by fall of rock while timbering in a level in Tunnel Mine.
13	″	Feb. 1st	John Wargo ..	Miner	Eye blown out by a premature blast through lighting a fuse before putting powder in hole.
14	Union	″ 8th	John Henry...	″	Ribs broken on left side and chest crushed by a fall of top coal in No. 4 Slope.
15	″	″ 9th	Kung Ah	Pithead-man . .	Badly bruised about the loin through being caught between the pit head and the railway cars at surface.
16	″	″ 11th	Antonio Toman	Miner	Slightly injured on the side of his face by a premature blast in No. 4 Slope.
17	″	″ 15th	W. B. Walker.	Overman....	
18	″	″ 15th	Geo. Turnbull.	Timberman .	
19	″	″ 15th	Robt. Steele ..	Cager	
20	″	″ 15th	Wm. Walker..	Driver......	
21	″	″ 15th	Geo. Walker ..	″	
22	″	″ 15th	Jos. Allison ...	″	
23	″	″ 15th	Robt. Flack...	Miner	

Detailed Statement of Accidents in B. C. Collieries during 1901.—*Continued.*

No.	Colliery.	Date.	Name.	Occupation.	Remarks.
24	Union	Feb. 15th	D. M. Davis	Miner	Killed in the explosion in No. 6 Shaft. Not one of those who were in the mine at the time escaped. An exhaustive examination was made by mining engineers and an inquest held. The verdict rendered was, "That the cause of the explosion is not disclosed by the evidence adduced at the inquest." All available evidence of the facts, and the opinions of the mining experts were considered at the inquest and published at the time.
25	"	" 15th	Jos. Crosetti	"	
26	"	" 15th	Chas. Bona	"	
27	"	" 15th	Duncan Munro.	"	
28	"	" 15th	Louis Simondi.	"	
29	"	" 15th	Jno Whyte.	"	
30	"	" 15th	Peter Bardisona	"	
31	"	" 15th	And. Smith	"	
32	"	" 15th	Thos. Lord	"	
33	"	" 15th	Wm. Sneddon.	"	
34	"	" 15th	Dan McInnis	"	
35	"	" 15th	Jas. Halliday	"	
36	"	" 15th	A. Mafaddo	"	
37	"	" 15th	I. Kinchite	Helper	
38	"	" 15th	T. Kukutam	"	
39	"	" 15th	G. Monkawa	"	
40	"	" 15th	S. Kurashima	"	
41	"	" 15th	Sanpei Okn	"	
42	"	" 15th	K. Ikegami	"	
43	"	" 15th	E. Muira	"	
44	"	" 15th	Chizoza Abo	"	
45	"	" 15th	E. Oketani	"	
46	"	" 15th	Mah T. Yong.	Miner	
47	"	" 15th	Mah B. Wing	"	
48	"	" 15th	Mah W. Chung	"	
49	"	" 15th	Mah Mon Jug.	"	
50	"	" 15th	Der Chow	"	
51	"	" 15th	Wong Sing	"	
52	"	" 15th	Yee Moo	"	
53	"	" 15th	Hog Yee	"	
54	"	" 15th	Chow S. Bing	"	
55	"	" 15th	Yee Q. Jung	"	
56	"	" 15th	Wong C. Pun	"	
57	"	" 15th	Wong Hip Boo.	"	
58	"	" 15th	Hong Gan	"	
59	"	" 15th	Lung Chnng	"	
60	"	" 15th	Woo Sang	"	
61	"	" 15th	Sue Lam	"	
62	"	" 15th	Jang Art	"	
63	"	" 15th	Fook Chnng	"	
64	"	" 15th	Lam Dina	"	
65	"	" 15th	Lam Chong	"	
66	"	" 15th	Tua Dam	"	
67	"	" 15th	Chan B. Yan	"	
68	"	" 15th	Dang Foy	"	
69	"	" 15th	Woo Hae	"	
70	"	" 15th	Mah Quong Tai	Tracklayer	
71	"	" 15th	Mah Hoy	"	
72	"	" 15th	Chong Keep	"	
73	"	" 15th	Mah Kune	Driver	
74	"	" 15th	Mah Chow	Runner	
75	"	" 15th	Gee Tan	"	
76	"	" 15th	Wong G. Chow	Timberman	
77	"	" 15th	Ah Dan	Helper	
78	"	" 15th	Wong Y. Hong	"	
79	"	" 15th	Mah Shy One	"	
80	Extension	" 21st	Jan Lahti	Miner	Killed in his stall in No. 2 Slope by fall of top coal, through neglect to put in spraggs.
81	"	" 23rd	M. Mariak	"	Leg broken by shot in No. 3 Slope.
82	"	" 26th	Thos. Baxter	"	Hand slightly burned by explosion of powder in No. 2 Slope.

DETAILED STATEMENT OF ACCIDENTS IN B. C. COLLIERIES DURING 1901.—*Continued.*

No.	Colliery.	Date.	Name.	Occupation.	Remarks.
83	Nanaimo	March 9th	C. Bowen	Miner	Rib broken and hurt about the back and chest by a fall of rock in No. 1 Shaft after firing a shot.
84	Extension	〃 9th	F. Hailstones..	Mule-driver ...	Knee slightly squeezed by an empty box in No. 3 Slope Mine.
85	Union	〃 13th	Jung Kee	Miner	Leg broken by being struck with a piece of coal while pulling it down in No. 4 Slope.
86	Extension	〃 15th	Wm. Gibbs ...	Rope-rider	Hip dislocated by stumbling over the rope on the slope in No. 2 Mine.
87	〃	〃 15th	Jas. Dickie....	Miner	Two ribs broken in No. 3 Mine by some soft shale sliding over the coal in his stall and striking him.
88	〃	〃 18th	And. Hupuala.	〃	Leg broken in the Tunnel Mine by a fall of top coal.
89	Union	〃 26th	John Annero..	〃	Back severely injured by being struck by the pilot of the locomotive at surface, while on his way to work in No. 4 Slope.
90	Nanaimo	〃 30th	Thos. Bradbury	Pusher	Slightly burned on hands and face by a spark from his lamp flying on to some loose powder that had been spilled in a car from a miner's powder can, in No. 1 Shaft.
91	Extension	April 4th	Chris. Sparks..	Miner	Killed in the Tunnel Mine in his stall through 10 or 12 tons of top coal and rock swinging over the props.
92	Nanaimo	〃 5th	B. Serventi ...	〃	Severely injured on the head with a fall of rock at his working place in No. 1 Shaft through neglecting to replace props.
93	Union	〃 9th	Neano (Jap.)..	Mule-driver ..	Leg broken in No. 4 Slope through being caught between mine cars.
94	〃	〃 10th	Ah Gow	Driver........	Killed by fall of rock through a car knocking out a prop.
95	Extension	〃 19th	David Davis ..	Miner	Killed by a fall of top coal in his stall in the Tunnel Mine through neglect to put in spraggs.
96	〃	〃 24th	John Harnas..	Driver........	Slightly burned by gas on hands and face in No. 3 Slope.
97	〃	May 7th	Eli Rowland ..	Miner	Arm broken by a fall of top coal in his stall in No. 1 Slope.
98	〃	〃 8th	H. Wilkeson..	〃	Slightly burned by gas which had gathered in his place in No. 2 Slope Mine.
99	〃	〃 17th	A. Donco	〃	Slightly burned by powder explosion in the Tunnel Mine through spark flying from his lamp.
100	〃	〃 17th	D. Riatti	〃	Slightly burned by gas while trying to light a fuse in No. 3 Slope.
101	〃	〃 20th	John Myoski..	〃	Leg broken by a fall of top coal in No. 2 Slope, while in the act of filling his car with coal in his place.

Detailed Statement of Accidents in B. C. Collieries during 1901.—*Continued.*

No.	Colliery.	Date.	Name.	Occupation.	Remarks.
102	Extension	June 3rd	John Barlow .	Miner	Injured about the face and lost one eye through explosion of delayed shot in the Tunnel Mine.
103	Nanaimo	〃 10th	Geo. Evans ...	〃	Slightly burned on hands and face by gas in No. 1 Shaft.
104	Union	〃 24th	Wm. Connor..	〃	Severely bruised by a fall of rock in his stall in No. 4 Slope.
105	Extension	〃 27th	A. Amalasco ..	Driver........	Slightly burned through a sudden accumulation of gas in No. 3 Mine.
106	Nanaimo	July 18th	E. Harrison. .	Miner	Killed in his stall at Protection Shaft by a large piece of rock falling on him while at work in his place, which was insufficiently timbered.
107	Union	〃 22nd	Ynig	〃	Instantly killed by a fall of rock in a level in No. 4 Slope Mine.
108	〃	〃 30th	Thos. Nicol ...	Pumpman ..	A fire took place at No. 9 pump station in the old slope of No. 4 Mine through some unknown cause. The fire was fought for two weeks, when it became necessary to flood the mine. These three men are still in the mine. The cause of the fire cannot be investigated until the water is pumped out.
109	〃	〃 30th	Song	Tracklayer..	
110	〃	〃 30th	Tye	〃 ..	
111	〃	August 1st	Wm. Maxwell.	Fireman	Four ribs broken in No. 4 Slope through neglecting to prop a piece of rock.
112	Extension.....	〃 7th	Jos. Fresseck .	Timberman . .	Back and leg broken by fall of coal when engaged in removing timbering.
113	〃	〃 8th	Matt. Lahti...	Miner	Slightly burned while working in No. 2 Slope.
114	Nanaimo	〃 8th	Robt. Jameson.	Cager	Killed (skull fractured) at the bottom of No. 1 Shaft, it is supposed by a piece of coal falling down the shaft.
115	Extension	〃 12th	Michael Quinn.	Fireman	Killed by an explosion of gas in No. 3 Slope Mine. Verdict at inquest, "that deceased came to his death through an explosion of gas, with a naked light."
116	〃	〃 22nd	M. Lefbakha..	Miner	Killed in No. 1 Tunnel Mine by a fall of top coal, which was not properly spragged.
117	Union	Sept. 9th	Don Him	〃	Slightly injured by a fall of rock in his stall in No. 6 Shaft.
118	Extension.....	〃 25th	J. Walker	Driver........	Slightly burned by gas in No. 1 Slope Mine.
119	Union	〃 28th	S. Corra	Timberman ...	Leg slightly injured by a fall of rock in No. 5 Shaft.
					A fire occurred in No. 2 Slope Mine, which was reported to have started from the igniting of a curtain between No. 3 Level and its counter on the slope. With the exception of these sixteen unfortunate men, all the workmen in

Detailed Statement of Accidents in B. C. Collieries during 1901.—*Continued.*

No.	Colliery.	Date.	Name.	Occupation.	Remarks.
120	Extension.....	Sept. 30th	G. Southcombe	Timberman .	Nos. 2 and 3 Slopes (which are connected) came out of the workings to the surface safely, among them being some miners and pushers who were working on that shift alongside the entombed men in No. 2 E. Level of No. 2 Slope Mine, and all, with the exception of the timbermen, Southcombe and Griffiths, could have escaped if they had adopted the same course as some of those did who were working by the side of them. The two timbermen saw the fire, and with the rope rider, John Thomas, started to run up the slope, but only Thomas, who was younger and more active, succeeded in getting out, as the fire was travelling up the slope at a terrific speed. As soon as the fire is extinguished, a thorough investigation will be made into the cause of the disaster.
121	〃	〃 30th	David Griffiths	〃 .	
122	〃 ...	〃 30th	Michael Dolan.	Miner	
123	〃	〃 30th	E. Lynd	〃	
124	〃	〃 30th	J. Blakley	〃	
125	〃	〃 30th	Fk. Mottishaw	Driver......	
126	〃	〃 30th	A. Reeves	〃	
127	〃	〃 30th	Wm. Hamilton	Pusher	
128	〃	〃 30th	Jno. Patterson.	Miner	
129	〃	〃 30th	Jas. Watson ..	〃	
130	〃	〃 30th	Wm. Pollock ..	〃	
131	〃	〃 30th	Jno. McCallum	〃	
132	〃	〃 30th	E. Hazel......	Pusher	
133	〃	〃 30th	Chas. Noye....	〃	
134	〃	〃 30th	A. Boyd	〃	
135	〃	〃 30th	Ant. Pescettelli	Miner	
136	〃	〃 30th	Geo. Cripps...	Driver........	Fatally crushed between some loaded and empty mine cars in No. 3 Slope Mine, through his mule suddenly starting while he was replacing some empty cars which had left the track.
137	Nanaimo	Oct. 8th	Geo. Waring ..	Miner	Severely injured on the head by the fall of a large piece of rock while working in his place in Harewood Mine.
138	Union	〃 26th	Mow	Pithead-man ..	Killed by falling down the No. 5 Shaft.
139	Extension.....	〃 28th	Wm. J. Bailey.	Fireman	Killed in the Tunnel Mine while making his inspection, by the fall of a piece of rock of 50 lbs. weight.
140	Union	〃 31st	Sing..........	Miner	Killed by a fall of rock in his stall while sitting down mining in No. 6 Shaft.
141	Nanaimo	Nov. 27th	Wm. Wilkinson	〃	Fatally injured by the fall of a piece of rock while at work in his stall, mining for a shot.
142	Union	Dec. 4th	Mah Yue	〃	Slightly burned on hands and face in No. 5 Shaft by powder, ignited by a spark from their lamps.
143	〃	〃 4th	Quan Tong....	〃	
144	Alexandria....	〃 6th	Walter Hunter	〃	Slightly hurt on the shoulder by rock and coal falling on him, while sitting down mining in his stall.
145	Extension.....	〃 11th	Al. McKennon.	Helper	Fatally injured by a fall of coal and rock, while engaged with his partner in extracting pillars.

DETAILED STATEMENT OF ACCIDENTS IN B. C. COLLIERIES DURING 1901.—*Concluded.*

REPORTED BY JAMES McGREGOR, INSPECTOR.

No.	Colliery.	Date.	Name.	Occupation.	Remarks.
1	Crow's Nest...	Jan. 26th	Abel Tompkins	Miner	Killed by fall of rock while working in his stall.
2	〃 ...	Feb. 25th	Chas. Williams	Driver........	Severely crushed between a mine car and prop.
3	〃 ...	Mar. 19th	Walter Wright	Miner	Finger cut off by fall of a piece of rock.
4	〃 ...	April 1st	Jos. Shootes .	Coupler.......	Scalp severely injured through his head being caught between two cars when coupling.
5	〃 ...	〃 17th	Aubrey Snow..	Coupler......	Foot badly crushed between motor and car.
6	〃 ...	May 8th	Thos. Caskin..	Miner	Slightly burned by an explosion of gas through using naked lights.
7	〃 ...	〃 8th	Wm. Atkinson.	〃	
8	〃 ...	〃 10th	Ber. Stanchino	〃	Slightly burnt by gas in No. 4 Mine, a prospect hole merely, in which they had no business.
9	〃 ...	〃 10th	Luigi Agosti ..	〃	
10	〃 ...	〃 15th	Henry Price ..	Rope-runner ..	Killed by a runaway car, which had become detached from its trip.
11	〃 ...	〃 20th	Steve Romani .	Miner	Fatally burned by an explosion of gas in his stall, into which he went although warned not to do so.
12	〃 ...	June 27th	Dan'l. McLean.	Trackhand	Sustained scalp wound and slight fracture of skull through fall of rock in his place.
13	Coal Creek....	〃 27th	Sam'l. Halfield.	Miner	Crushed by fall of rock, while at work in his stall.
14	〃	July 31st	David Ray....	〃	Collar bone fractured through his being caught between a car and pillar.
15	〃	Aug. 7th	Robt. Hunter .	Engineer	Hand badly crushed while cleaning fan engine.
16	〃	〃 10th	James Berry ..	Fireboss	Leg fractured through being run over by a trip of loaded cars.
17	〃	〃 22nd	W. Clarkson ..	Miner	Leg fractured by fall of a piece of rock.
18	〃	Oct. 17th	Harry Wilson.	Trapper	Leg fractured by rope used for hauling coal from No. 3 Mine slipping off sheave pulley and striking him.
19	〃 ...	〃 22nd	Thos. Talbot ..	Weighman ...	Leg fractured by slipping and falling when at work.
20	〃	Dec. 3rd	Jacob Ericson .	Miner	Slightly burned about face by explosion of small feeder of gas.
21	〃	〃 6th	And. Pulson .	〃	Leg crushed between two mine cars.
22	〃	〃 15th	B. Cappo	Labourer	Left leg injured by fall of some boards.

LIST OF CROWN-GRANTED MINERAL CLAIMS.

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CROWN GRANTS ISSUED IN 1901.

CARIBOO.

Name of Claim.	Division.	Name of Grantee.	Lot No.	Acres.	Date.
Eagle Fraction	Cariboo	Oriole Syndicate, Ltd.	302	29.87	Oct. 7
Gold Finch No. 2	″	″	301	49 63	″ 7
Gladstone	″	″	303	47.59	″ 7

ATLIN.

Gladstone	Atlin	Ernest W. Hamilton	164	33.35	Feb. 25
Imperial	″	″	198	51.65	″ 25
Independent Fract.	″	Harriet B. Harriman	291	5.42	June 18
Ida E	″	Albert Franklin Deachman	202	31.83	″ 18
Kitchener	″	Mary E. Hitchcock	203	44.53	″ 18
Lucky Liverpool	″	Thos. H. Jones	194	11.11	Feb. 25
M. J. G.	″	Ernest W. Hamilton	163	22.86	″ 25
Nanaimo	″	Wm. Moore	193	45.03	″ 25
Nimrod	″	Nimrod Syndicate, Ltd	197	46.50	″ 25
Paris Exhibition	″	Wm. Moore	195	46.40	″ 25
Sultan Fraction	″	Ernest W. Hamilton	199	36.89	″ 25
Transit Fraction	″	″	200	18.26	″ 25
Unknown	″	James Stokes	196	42.79	″ 25

WEST KOOTENAY.

Allonez	Ainsworth	Empire Mines of B. C., Ltd	4480	51.65	Feb. 7
Alice No. 2	″	London & Pacific Gold Fields, Ltd	1848	8.00	″ 21
Anna May	″	T. J. Lendrum & A. L. Davis	4804	17.73	March 19
Albermarle Fra. Fr.	Nelson	London & Rossland, B. C., Ltd	3842	12.00	″ 19
Alberta	Revelstoke	J. M. Robinson & Alberta M. Moore	4285	24.20	May 30
Ainsworth	Ainsworth	Chas. S. Allmen & J. M. Ashton	3657	20.00	June 3
Alice Murphy	Trout Lake	Frank Cox	4516	34.37	″ 27
Ajax	Slocan	Ajax Mining & Dev. Co., Ltd. (Non-per.)	585	9.74	July 31
Aspen	Nelson	Molly Gibson Mining Co., Ltd. (Non-per.)	1578	51.65	Aug. 8
Alice	″	The Duncan Mines, Ltd., *et al*	3248	51.65	Oct. 10
Anglo American Fr.	Arrow Lake	Michael D. Shea	4066	7.67	″ 23
Alice Fraction	Goat River	Geo. Alexander	4969	44.03	Nov. 20
Armstrong	Nelson	Transvaal-Zambesi Co., Ltd.	5483	51.65	Dec. 12
Boundary No. 2	Trail Creek	Chas. Connell & John A. Forin	4666	37.60	March 21
Bonanza No. 3	″	Rossland Bonanza Gold Mining & Milling Co., Ltd., (Non-personal)	5003	43 68	May 30
Blue Bell	″	New Gold Fields of B. C., Ltd	5206	50.48	″ 30
Bat Fraction	Ainsworth	Chas. S. Allmen & J. M. Ashton	4030, G 1	3.76	June 3
Big Fraction	″	Henry Midlicott Rumble	5091	8.03	″ 4
Bryan Fraction	″	The Erl Syndicate, Ltd	3335	18.60	″ 12
Berresford	Nelson	Columbia Proprietary, Ltd	3730	48.73	″ 12
Burlington	Trail Creek	Robt. Lamont	4359	37.98	″ 25
Big Four	Nelson	J. E. Wize & A. N. Paterson	4673	46.88	″ 26
Black Bear	Lardeau	Black Bear Mng. Co., of Lardeau, B. C., Ltd. (Non-personal)	5086	51.65	July 16

West Kootenay.—*Continued.*

Name of Claim.	Division.	Name of Grantee.	Lot No.	Acres.	Date.
Big 2	Nelson	J. S. Clute, Jr.	4637	13.56	Aug. 12
Bonanza	〃	〃	4638	25.73	〃 12
Blackstone	Trail Creek	〃	4631	44.00	〃 14
Belvidere Fraction	〃	W. P. Dockerill	4629	46.29	〃 15
Black Diamond	Ainsworth	John F. Stevens	5047	4.13	〃 20
Black Night	Nelson	Transvaal-Zambesi Co., Ltd	5486	10.04	Dec. 12
Bank	〃	〃	5487	17.89	〃 12
Blackburn	Ainsworth	Carter H. Brindle *et al*	5190	51.65	〃 27
B. X.	Trail Creek	J. F. Merrison	1779	26.08	〃 27
Conatte Fract.	Nelson	Christoph Sherbart & A. S. Gray	2050	29.20	Jan. 14
Crested Butte	Ainsworth	Empire Mines of B. C., Ltd.	4481	51.65	Feb. 7
Charlotte	Slocan	Washington Mining Co. (Foreign) & E. H. Tomlinson	2631	12.10	March 18
Campsy Glen	Nelson	J. McL. Campbell	4803	43.75	April 2
Copper Bar	Trail Creek	B. C. (Rossland & Slocan) Syndicate, Ltd.	3301	49.74	May 30
Cliff Extenson	Slocan	M. R. W. Rathborne & H. B. Alexander	2607	8.73	〃 30
Cascade	Trail Creek	The Cascade Gold Mining & Milling Co., Ltd. (Non-personal)	5000	39.76	〃 30
California	〃	〃 〃 〃	5001	42.83	〃 30
Canuck	Ainsworth	H. M. Rumball	5090	39.50	June 4
Cruisier	Trail Creek	J. W. Thornton, D. F. Johnston & M. A. Graves	3780	51.65	〃 12
Champane	Nelson	Rio Grande Mining Co., Ltd	5131	18.36	〃 24
Copper Dollar	Lardeau	James Anson Magee	3087	50.27	July 17
Canadian Belle	Nelson	G. W. B. Heathcote	4783	50.10	Aug. 13
Canadian Belle No. 2	〃	〃	4784	50.82	〃 13
Canadian Girl Frac.	〃	〃	4785	40.02	〃 13
Cariboo	Ainsworth	Luke Sweetser	631	23.85	〃 14
Climax No. 3	Slocan City	C. E. Miller & J. H. Wallace	5316	25.19	〃 16
Champion	Nelson	Math. Nelson	4648	50.48	〃 20
Comet	〃	Duncan Mines, Ltd., J. C. Dunlop & R. W. Gibson	3273	41.95	〃 22
Calumet	〃	〃 〃 〃	5123	44.23	〃 22
Centre Star	Arrow Lake	J. M. Ashton	4112	44.60	Sept. 9
Corker No. 2	Slocan City	J. A. Davis & Wm. Findlay	5494	21.08	Oct. 8
Columbia No. 5	〃	Hugh Sutherland	5225	44.92	〃 8
Cable	Nelson	A. L. Davenport	5138	41.88	〃 9
Cedar	Slocan	Scottish Colonial Gold Fields, Ltd., & Geo. W. Hughes	3528	38.28	〃 9
Condor	Nelson	Duncan Mines, Ltd. *et al*	3250	49.97	〃 10
Compeditor	Trail Creek	Ernest W. Liljegran	5426	43.30	Nov. 15
Chief	Slocan	R. C. Campbell Johnston	2808	32 23	〃 18
Delta	Trail Creek	Jerome L. Drumheller, T. A. Cameron & Robt. E. Young	4076	36.90	March 29
Dolley Varden	Slocan	J. M. Martin, W. A. Arnold & A. Robinson	4101	51.65	May 31
Dufferin	Nelson	Columbia Proprietary, Ltd.	3731	47.48	June 12
Denmark	〃	Primrose Gold Mining Co., Ltd	4389	48.62	〃 25
Death on the Trail	Ainsworth	Geo. H. Bayne	4986	45.84	Sept. 12
Dora	Nelson	Herbert Porter	5152	43.04	Oct. 24
Denver	Slocan	R. C. Campbell Johnston	2807	36 48	Nov. 18
Eclipse	Nelson	G. N. Thompson, Jas. Anderson, A. Ferland & J. A. Cowan	3674	32.15	March 21
Enterprise Frac.	Slocan City	Enterprise (B. C.) Mines, Ltd	4522	1.41	April 1
Evening Star No. 7	〃	Duncan Graham & D. Saulter	5235	51.65	〃 2
Erin Fraction	〃	〃 〃	5236	10.82	〃 2
Eda	Ainsworth	King Solomon Mining Company	5043	35.60	June 4
Eda Fractional	Slocan City	R. T. Kirkwood & C. E. Smitheringale	2363	47.09	〃 27
Edna	Ainsworth	Primrose Gold Mining Co., Ltd	4763	57.65	July 17
Evening Star	Arrow Lake	James M. Ashton	4113	43.16	Sept. 9
Eva	Lardeau	E. B. Hutchinson	5172	10.65	Oct. 8
Evening Star No. 8	Slocan City	Hugh Sutherland	5226	42.76	〃 8
Eclipse No. 2 Frac.	〃	〃	5228	1.91	〃 8
Eclipse No. 2	〃	〃	5229	45.70	〃 8
Ettie	Lardeau	W. H. Jackson	5156	27.05	〃 8

WEST KOOTENAY.—*Continued.*

Name of Claim.	Division.	Name of Grantee.	Lot No.	Acres.	Date.
Eclipse	Lardeau	W. H. Jackson	5170	39.33	Oct. 8
Empress	Trail Creek	G. H. Bayne & A. D. Provand	1272	37.20	〃 9
Erie	Slocan	Erie Mining & Milling Co., Ltd	3995	29.68	〃 21
Erie	Nelson	Transvaal-Zambesi Co., Ltd	5485	33.74	Dec. 12
Ema	〃	Wm. Douglas	2913	15.21	〃 13
Frances Jewell	Ainsworth	Lane C. Gilliam *et al*	3467	51.65	Feb. 19
Fog Horn	Nelson	Thos. Kane	5204	33.30	March 21
Falls View	Goat River	B. C. (Rossland & Slocan) Syndicate, Ltd	4997	47.22	April 1
Flying Dutchman	Nelson	W. H. Hutchinson *et al.*	5146	38.29	June 20
Florence	〃	Molly Gibson Mining Co., Ltd. (Non-per.)	1716	51.65	Aug. 8
Franklin	〃	J. S. Clute, Jr	4635	23.07	〃 12
Florence Frac'l Fra.	〃	Christoph Sherbart	1718	24.56	〃 12
Fairlove	Trail Creek	Ernest W. Liljegran	5220	40.60	Nov. 15
Ferndale	〃	〃	5221	25.30	〃 15
Golden Giant	Nelson	Aaron H. Kelly	4655	40.45	Feb. 6
Gold Bell	〃	〃	4657	47.24	〃 6
Granite King	Ainsworth	C. B. McDonald, F. C. Baker, J. F. McIntosh & Oliver T. Stone	4538	45.34	March 19
Gray Eagle	〃	〃 〃 〃	4539	51.34	〃 19
Golden Terra	Trail Creek	Charles W. Doud	1338	5.78	〃 19
Grey Eagle	〃	B. C. (Rossland & Slocan) Syndicate, Ltd	3713	45.05	〃 22
Good Hope	〃	〃 〃	4005	49.27	〃 22
Gray Copper	Goat River	〃 〃	4999	50.12	April 1
Grace Darling	Trail Creek	〃 〃	3302	47.05	〃 2
Gilford	Nelson	Erie Mtn. Cons. Mg. Co., Ltd. (Non-per.)	4624	36.82	May 30
Glenside	Revelstoke	J. M. Robinson, E. F. Moyer & Robt. A. T. Moore	4281	51.65	〃 30
Golden Cross	Nelson	Referendum Free Gold Mg. & M. Co., Ltd., (Non-personal)	4388	49.05	〃 30
Galena Fraction	Slocan	G. M. Hayes, T. B. Mayand & F. H. Wilson	4895	4.09	June 17
Gorgina	Nelson	Rio Grande Mg. Co., Ltd	5130	33.74	〃 24
Gorilla	Trail Creek	H. L. A. Keller, A. L. A. Keller & N. F. Townsend	2119	14.04	〃 26
Grey Copper	Trout Lake	Frank Cox	4517	41.82	〃 27
Gold Crown	Nelson	H. J. Wilson	3939	30.58	July 15
Grace C.	Ainsworth	Primrose Gold Mg. Co., Ltd	4698	51.65	〃 17
Grace C. Fraction	〃	〃 〃	4704	32.31	〃 17
Gladstone	Trail Creek	J. S. Clute, Jr	4663	44.46	Aug. 14
Golden Queen	Nelson	Eliza Ann Crowe	5284	51.65	Sept. 10
Gen. White Frac.	〃	A. L. Davenport	5140	27.04	Oct. 9
Golden Hope	Arrow Lake	Michael D. Shea	1797	51.65	〃 23
Golden Age	〃	〃	4665	51.65	〃 23
Good Enough	Nelson	J. Bernard, D. Boyer & Paul Bonnet	5466	44.64	Nov. 18
Globe	Ainsworth	Seymour F. Detchon & G. S. Wallis	4457	36.91	Dec. 18
Heber Fraction	Slocan	Star Mg. & M. Co., Ltd	4681	13.91	Feb. 11
Herbert	〃	Washington Mg. Co. (For.) & E. H. Tomlinson	2632	16.70	March 18
Homestake	Goat River	B. C. (Rossland & Slocan) Synd. Ltd.	4998	51.65	April 1
Harrisburg	Trail Creek	F. A. Heinze & W. D. Vincent	1449	31.00	〃 2
Houlton	Nelson	Eric Consol. Mg. Co., Ltd., (Non-per.)	4626	46.00	May 30
Herbert L.	Ainsworth	King Solomon Mg. Co	5044	37.70	July 19
Hazard	〃	Frank Owen	1396	40.50	Aug. 21
Highland Mary	Lardeau	J. M. Tweedie & J. A. Magee	5171	34.75	Oct. 7
Horsehoe	Revelstoke	Edwin Hillman & Geo. S. McCarter	5342	50.62	Dec. 27
I. C.	Slocan	Washington Mg. Co. (Foreign)	4893	19.49	March 8
Imperial	Nelson	P. N. Thompson and Jas. Anderson	3283	50.18	〃 21
Ironclad	Trail Creek	J. L. Drumheller, T. A. Cameron and Robt. E. Young	4073	40.17	〃 29
Iron King No. 2	〃	H. P. Jones, A. McDonald & Rose McGlynn	1142	21.65	June 28
Independence	Nelson	W. H. Hutchinson *et al*	5148	22.17	〃 20
Iron Dollar	Lardeau	James W. Tweedie	5173	14.75	Oct. 8
I. X. L.	Arrow Lake	Michael D. Shea	1782	45.52	〃 23
Iron Silver	Nelson	G. Davis and J. H. Nolan	3242	33.67	Dec. 3

WEST KOOTENAY.—*Continued.*

Name of Claim.	Division.	Name of Grantee.	Lot No.	Acres.	Date.
Joke	Ainsworth	Maxwell Stevenson	2348	15.30	March 19
Joanna	Trail Creek	Thos. H. Tracy	3225	48.00	....
Josie	Revelstoke	E. G. Moyer and J. M. Robinson	4284	46.72	....
Julius Cæsar	Nelson	A. H. Kelly, E. C. Arthur and J. P. Rogers	3591	37.67	Aug. 23
Knoxville Fraction.	Trail Creek	Jos. D. Blevins	2196	.33	March 21
Katie	Nelson	Referendum Free Gd. Mg. & Mllg. Co, Ltd. (Non-per.)	4386	36.40	May 30
Kid	Trail	H. P. Jones, A. McDonald & Rose McGlynn	1143	46.14	June 5
Kangaroo	Lardeau	Bear Creek Mg. Co. of Lardeau, B. C., Ltd. (Non-per.)	5087	33.45	July 16
Keystone	Trail Creek	J. S. Clute, Jr	4630	49.72	Aug. 14
Keystone Fraction	Nelson	A. L. Davenport	5137	21.86	Oct. 9
Kingston	Trail Creek	A. D. Provand and G. H. Bayne	1124	51.65	〃 24
Kelpie	Slocan	R. C. Campbell Johnston	2809	10.97	Nov. 12
Kootenay Chief	Lardeau	Andrew T. R. Blackwood	2147	51.65	Dec. 16
Kate	Ainsworth	Zachariah Montgomery	4805	15.34	〃 23
Kootenay Pass	Slocan City	Herman Clever *et al*	2882	50.37	〃 27
Lexington	Nelson	London & Rossland (B. C.) Ltd	3718	46.66	Feb. 11
Lucille K	Ainsworth	Chas. W. Williams *et al*	3465	51.65	〃 19
Last Chance	Trail	Geo. M. Miller	3027	17.96	March 21
Lone Bachelor	Slocan	Geo. A. Pitty	4564	46.69	〃 28
Liberty	Nelson	Slocan Liberty Hill Mg. Co	4900	50.94	May 2
Last Chance No. 2.	Slocan	Geo. Kydd	5233	51.04	〃 30
Leinster Light	Trail Creek	J. B. McArthur, S. L. Long, P. Burns & T. S. Gilmour	2397	5.16	〃 30
Lake View	Ainsworth	Chas. S. Allmen & J. M. Ashton	3653	49.65	June 3
Latest Out	Trail Creek	John Powers	959	32.00	〃 5
Lucky Seven	Nelson	James E. Wize	4674	39.60	〃 25
Lily	Slocan	John MacQuillan	2491	39.15	Aug. 2
LaPlata Fraction	Nelson	Molly Gibson Mg. Co., Ltd. (Non-per.)	1719	12.94	〃 8
Little Duke	〃	〃 〃 〃	4392	50.00	〃 8
Little Fraction Fra.	〃	〃 〃 〃	4393	4.49	〃 8
Lucky Boy	Ainsworth	Luke Sweetser	632	19.00	〃 14
L. Nora	Trail Creek	G. N. Taylor, Smith Ely & J. Olsen	4203	38.90	〃 15
Little George	Nelson	Duncan Mines, Ltd., J. C. Dunlop & R. W. Gibson	5121	48.14	〃 22
Lexington No. 3	Arrow Lake	J. M. Ashton	4110	51.65	Sept. 9
Little Tommy	Ainsworth	Geo. H. Bayne	4985	37.23	〃 12
Little Bess	Trail Creek	A. G. Russell Snow	3850	34.30	〃 12
Last Chance	Lardeau	J. A. Magee, J. M. Tweedie & E. B. Hutchinson	5174	13.21	Oct. 7
Lake Shore	Slocan	R. C. Campbell Johnston	2810	51.65	Nov. 12
Last Chance	Trail Creek	John Ryan & G. Petersen	4611	21.80	〃 18
Mineral Mountain	Slocan City	R. T. Kirkwood	2362	51.65	June 25
Mollie O	Slocan	J. A. Whittier, C. P. Hill, J. F. McIntosh & D. J. Munn	1913	28.17	〃 31
Mountain Bell	Trail Creek	Hans Petersen *et al*	4023	51.65	March 15
Major Fraction	Slocan	Washington Mg. Co. (For.) & E. H. Tomlinson	4896	15.10	....
Magna Charta	Trail Creek	B. C. (Rossland & Slocan) Synd., Ltd	3300	51.65	April 2
Mastodon	Nelson	Slocan-Liberty Hill Mg. Co	4902	47.30	May 2
Montague	Revelstoke	Gold Flds. of B. C. Ltd	3596	51.65	〃 30
M. S. C	Nelson	Erie Mtn. Cons. Mg. Co., Ltd. (Non-per.)	4623	49.00	〃 30
Mabee	〃	〃 〃	4625	29.50	〃 30
Minnie No. 2	Trail Creek	Canada Mutual Mg. & Dev. Co., Ltd	1627	32.30	June 10
Mist Fractional	Nelson	Columbian Proprietary, Ltd	4372	25.39	〃 12
Mars	〃	W. H. Hutchinson *et al*	5149	48.57	〃 20
Mountain Chief	Trail Creek	J. S. Clute, Jr	2393	51.65	July 18
Mount'n Chief No. 3	Slocan	Alfred Hill *et al*	4470	25.08	〃 18
Mariposa	Trail Creek	J. A. Denholm and Griffith Davies	1214	30.47	〃 20
Molly Gibson	Nelson	Molly Gibson Mg. Co., Ltd. (Non-per.)	1579	51.65	Aug. 8
Monte Carlo	Ainsworth	Luke Sweetzer	635	15.25	〃 14
Mascot	Nelson	A. H. Kelly, E. C. Arthur and J. P. Rogers	3588	49.96	Sept. 26
Maggie	〃	Andrew Sostad	5144	31.00	〃 12

WEST KOOTENAY.—*Continued.*

Name of Claim.	Division.	Name of Grantee.	Lot No.	Acres.	Date.
Multnomah	Trail Creek	E. W. Liljegran	5219	43.90	Nov. 15
Moss	〃	〃	5425	7.10	〃 15
Montana	Goat River	J. F. Wilson and J. E. Spaulding	2349	19.78	〃 20
Myee	Nelson	Transvaal-Zambesi Co., Ltd	5489	27.04	Dec. 12
Martha Washington	〃	Chas. Astley Owen	5031	34.19	〃 12
Monument	〃	Louis Strand and Steve Hawkins	5012	47.57	〃 18
Neganee	Ainsworth	Empire Mines of B. C., Ltd	4477	39.87	Feb. 7
North Star	Trail Creek	B. C. (Rossland & Slocan) Synd., Ltd	3712	47.24	March 22
Newport	Slocan	Geo. A. Petty	4521	47.95	〃 28
Nellie Gray	Trail Creek	J. L. Drumheller, T. A. Cameron and Robt. E. Young	4071	46.21	〃 29
No. 1 Fraction Good Hope Fractional	Nelson	Oriel Mg. & Mllg. Co. Ltd	4383	13.42	April 2
No. 6	〃	James E. Wize	4671	28.07	June 25
Number Two	〃	〃 and A. N. Paterson	4670	25.60	〃 26
No. 5	Trail Creek	〃 〃	4672	34.22	〃 26
Neb. Girl	〃	J. S. Clute, Jr	4636	31.13	Aug. 12
Our Hope	〃	Rossland Bonanza Gold Mg. & Mllg. Co., Ltd. (Non-per.)	5004	27.54	April 26
Ogontz	Revelstoke	J. M. Robinson, Ole Arvog, Enos Moyer and R. A. F. Moore	4282	51.65	May 30
Ottawa	Slocan City	Thos. Mulvey *et al*	4968	51.65	June 5
Ogema	Slocan	Geo. Alexander	3163	10.40	July 18
Ora Granda	Arrow Lake	Geo. H. Doerr, W. H. Burtt & Geo. M. Annis	4659	50.44	Sept. 14
Omega Fraction	Nelson	A. L. Davenport	5141	47.25	Oct. 9
Old Man	Slocan	R. C. Campbell Johnston	2811	28.25	Nov. 12
Oraphlegm	Trail Creek	Ernest W. Liljegran	5427	7.10	〃 15
Pewabic	Ainsworth	Empire Mines of B. C., Ltd	4478	51.65	Feb. 7
Pewabic Fraction	〃	〃	4479	12.46	〃 7
Pulaski Fraction	Nelson	London & Rossland, B. C. Ltd	4360	8.65	〃 11
Princess Marie	Ainsworth	J. A. Kennedy *et al*	3475	50.59	〃 19
Pulaski	Nelson	London & Rossland B. C., Ltd	3403	39.00	March 19
Province	Ainsworth	Maud H. Briggs, R. P. Briggs and Henry Geigerich	5042	50.27	〃 22
Pittsburg	Trail Creek	J. L. Drumheller, T. A. Cameron and Robt. E. Young	4075	41.90	〃 28
Park	Goat River	B. C. (Rossland & Slocan) Synd., Ltd	4995	51.42	April 1
Princess No. 1	Nelson	Erie Cons. Min. Co., Ltd. (Non-per.)	4627	51.64	May 30
Princess	Trail Creek	Allen G. White and Nicholas Reuter	4669	29.73	June 19
Pilot Knob	Nelson	W. H. Hutchinson *et al*	5145	48.65	〃 20
Phoebus	〃	〃	5147	29.01	〃 20
Primrose Fraction	Ainsworth	Primrose Gold Mg. Co., Ltd	4701	4.95	July 17
Pat	Nelson	John Philbert and Oliver Blair	2198	48.38	〃 20
Porcupine	〃	J. S. Clute	4634	51.65	Aug. 9
Planet	〃	Duncan Mines, Ltd., J. C. Dunlop and R. W. Gibson	3271	51.65	〃 22
Patricko	Ainsworth	J. A. Linroth and A. Anderson	5189	51.65	〃 23
Polar Star	Arrow Lake	James M. Ashton	4114	16.30	Sept. 9
Producer	〃	Michael D. Shea	1795	40.00	Oct. 23
Prince of Wales	Trail Creek	John Ryan and Gust. Petersen	1985	25.35	Nov. 18
Pinnacle	Nelson	Transvaal-Zambesi Co., Ltd	5490	51.65	Dec. 12
Queen Mary	Ainsworth	Henry N. Boss, admin. of estate of John C. Wagner, dec'd, *et al*	3469	51.35	Feb. 19
Rising Sun No. 2	〃	Empire Mines of B. C., Ltd	4466	28.81	〃 7
Revelstoke	〃	〃	4476	51.65	〃 7
Ronoke	Nelson	London & Rossland (B.C.), Ltd	3402	51.65	March 19
Rossland Fraction	Trail Creek	Geo. Lemon and Peter McL. Forin	4667	12.70	〃 21
Referendum	Nelson	Referendum Free Gold Mg. & Mllg. Co., Ltd. (Non-per.)	4387	31.20	May 30
Royal Kangaroo	Trail Creek	Cascade Gd. Mg. & Mllg. Co., Ltd (Non-per.)	5002	47.66	〃 30
Royal	Nelson	Silver Crown Consol. Mg. Co. (For.)	4610	51.65	June 11
Rio Grande Fraction	〃	Rio Grande Mg. Co., Ltd	5132	17.45	〃 24
Rocket	〃	Duncan Mines, Ltd	3272	51.75	Aug. 22

WEST KOOTENAY.—*Continued.*

Name of Claim.	Division.	Name of Grantee.	Lot No.	Acres.	Date.
Rebecca	Nelson	Aaron H. Kelly, E. C. Arthur and J. P. Rogers	3589	41.83	Aug. 23
Red Rock	"	John Love, Robt. S. Lennie and A. H. Kelly	3590	44.53	" 24
Romance	"	Duncan Mines, Ltd., *et al*	3249	36.19	Oct. 10
Ruth Fraction	Trail Creek	Arthur S. Goodeve	3231	2.77	Dec. 13
Rocky Fraction	Slocan City	Herman Clever *et al*	2883	5.03	" 27
Speculator	Slocan City	Thos. Kilpatrick & R. T. Kirkwood	2360	51.65	Jan. 18
Speculator Frac.	"	R. T. Kirkwood	2361	7.43	" 24
Shiloh	Nelson	Silver Crown Cons. Mg. Co. (For.)	3847	48.31	March 14
Saddie	Slocan	J. C. Ryan, J. H. Bowes & Grange V. Holt	1302	20.40	Jan. 30
Sun Fractional	Ainsworth	Empire Mines of B. C., Ltd	4465	49.72	Feb. 7
Silver Fox	"	D. F. Strobeck & J. R. Hardie	4100	30.50	March 23
Spokane	Trail Creek	J. L. Drumheller, T. A. Cameron & R. E. Young	4072	36.56	" 28
Skylark	Goat River	B. C. (Rossland & Slocan) Synd. Ltd	4994	49.84	April 1
Solo	Ainsworth	L. P. Duff & Louisa Redon	4563	34.10	May 30
Solo Best	"	" "	4177	33.90	" 30
Sunrise	Nelson	John Denn & Jacob Stierle	4385	38.17	June 24
Sandaulphon	"	Rio Grande Mg. Co., Ltd	4639	6.14	" 24
St. Charles	Trail Creek	Richard T. Daniel & Jos. Kloman	1689	35.25	" 19
Seattle	Nelson	Primrose Gld. Mg. Co., Ltd	4391	43.77	" 25
Silver Reef	Slocan	Michael C. Monaghan, Howell W. Peel & L. H. Snyder	3996	41.35	April 26
Silver Leaf	Ainsworth	James M. Miller	4699	50.40	July 17
Silver Leaf Frac.	"	"	4708	10.32	" 17
Silver Queen	"	Old Gold Quartz & Placer Mg. Co., Ltd	4694	51.65	" 17
Silver King	"	" "	4695	51.65	" 17
Silver King Frac	"	" "	4696	36.34	" 17
Sarnia	Slocan	Alfred Hill *et al*	4471	7.67	" 18
Safeguard	Nelson	Geo. W. B. Heathcote	4786	23.89	Aug. 13
Star Fraction	Arrow Lake	James M. Ashton	4109	44.69	Sept. 9
South Star	"	"	4111	37.23	" 9
Sampson	Trail Creek	E. J. Balfour	4074	34.20	" 25
Seattle	Revelstoke	J. W. Emerson, J. D. Boyd & J. M. Kellie	4814	51.65	Oct. 4
Somerset	Slocan City	Hugh Sutherland	5224	38.83	" 8
Silver Crown	"	"	5227	9.23	" 8
Sandon Chief	Slocan	Henry A. Barton	3258	18.39	" 9
Snow Bird	Arrow Lake	Michael D. Shea	1796	39.35	" 23
Santa Rita	Ainsworth	Chas. R. Conner	4989	51.65	" 24
Seattle No. 3	Slocan City	John Dempsey, Stilman C. Jackson & Geo. E. Winant	4965	36.10	Nov. 13
Sunlight Fraction	"	Hastings (B. C.) Exploration Synd., Ltd	5319	26.24	" 20
Silver Queen	Nelson	Geo. Davis & J. H. Nolan	5477	31.11	Dec. 3
Sherman	"	Transvaal-Zambesi Co., Ltd	5491	27.08	" 12
Silver Star Fraction	Slocan City	Thos. Mulvey	5495	29.17	" 27
Tip Top Fraction	Nelson	Aaron H. Kelly	4656	35.43	Feb. 6
Townsite	Trail Creek	Geo. E. Pfunder *et al*	3012	41.51	March 22
Tangier	Revelstoke	Gold Flds. of B. C., Ltd	3600	51.65	May 30
Trenton	Slocan City	Geo. Kydd	5232	42.46	" 30
Treasure Vault	Slocan	American Boy Mg. & Mllg. Co	587	13.00	June 28
Toronto	Nelson	Math. Nelson	4646	51.65	Aug. 20
Tailor Boys	Trail Creek	Saml. Geo. Thompson	5005	17.02	" 22
Ten Brok	Nelson	A. L. Davenport	5139	40.55	Oct. 9
Trio	Arrow Lake	Michael D. Shea	4677	51.00	" 23
Treasure Box	Nelson	Transvaal-Zambesi Co., Ltd	5484	49.92	Dec. 12
Tamarcan	Lardeau	Andrew T. R. Blackwood	2151	17.55	" 16
Unknown Group	Slocan City	Hugh Sutherland	5230	48.70	Oct. 8
Violet	Trail Creek	B. C. (Rossland & Slocan) Synd., Ltd	3714	50.98	Feb. 22
Victor	Slocan	Geo. A. Petty	4565	30.74	" 28
Victoria	Goat River	B. C. (Rossland & Slocan) Synd., Ltd	4996	35.26	April 1
Velvet Fraction	Trail Creek	Velvet (Rossland) Mine, Ltd	5205	7.43	" 2
Vera	Revelstoke	Robt. A. F. Moore & J. M. Robinson	4283	47.50	May 30
Venus	Nelson	Wm. H. Hutchinson & Paul Paulson	5150	46.68	June 20

WEST KOOTENAY.—*Concluded.*

Name of Claim.	Division.	Name of Grantee.	Lot No.	Acres.	Date.
V. M. W.	Ainsworth	Old Gold Quartz & Placer Mng. Co., Ltd.	4706	51.65	July 17
Viking Fractional	Nelson	Math. Nelson	4649	20.84	Aug. 20
Vermont	Arrow Lake	Jas. M. Ashton	4107	51.65	Sept. 9
Vancouver	Nelson	Chas. A. Calzin	5476	51.65	Oct. 24
Whitewater Deep Fraction	Ainsworth	Erl Syndicate, Ltd	2268	12.35	Feb. 12
Washington Frac.	Slocan	Washington Mg. Co. (For.)	4894	4.30	March 8
Waverly	Revelstoke	Waverly Mines, Ltd	3597	44.88	May 30
Wren	Nelson	Duncan Mines, Ltd., J. C. Dunlop and Rich. W. Gibson	5122	46.36	Aug. 22
Westminster	Arrow Lake	James M. Ashton	4108	40.35	Sept. 9
Wedge Fractional	Lardeau	Imperial Dev. Synd., Ltd	5176	2.49	Oct. 7
White Fractional	Nelson	A. L. Davenport	5140	27.04	〃 9
Winnipeg	Lardeau	Andrew T. R. Blackwood & A. L. McKillop	2150	43.68	Dec. 16
X Ray	Ainsworth	Henry M. Rumball	5089	51.65	June 4
X 10 u S	Nelson	Transvaal-Zambesi Co., Ltd	5488	51.65	Dec. 12
Yellowstone	Trail Creek	J. S. Clute, Jr	4632	37.67	Aug. 14
Zuni	Ainsworth	Silver Crown Mg. Co., Ltd. (Non-per.)	4898	46.20	March 11

EAST KOOTENAY.

Name of Claim.	Division.	Name of Grantee.	Lot No.	Acres.	Date.
Brandon	Fort Steele	Thos. Mayne Daly	5629	46.58	Nov. 4
Black Prince	〃	Caldwell Mines, Ltd. (Non-per.)	5210	19.50	Dec. 18
Blue Jay	〃	〃 〃	5213	24.30	〃 18
Canton	Fort Steele	Percy C. Andrews	5630	41.56	Nov. 4
Cromarty	〃	Robt. L. White	5632	51.38	〃 4
Fullhouse	Fort Steele	A. Maude Williams	5631	48.94	〃 4
Faragut Fraction	〃	Caldwell Mines, Ltd. (Non-per.)	5212	30.30	Dec. 18
Greenhorn Fraction	Fort Steele	Walter Van Arsdalen, Elgin E. Jones, David K. Niwell & Robt. Dempsey	3904	9.28	Aug. 7
Giant	〃	Mastodon Gld. & Copper Co	5445	48.80	Oct. 8
Great Bear	〃	Arthur S. Goodeve	4090	48.53	〃 9
Gem	〃	〃	4091	38.64	〃 9
Great Dane	〃	Georgina LaPointe, H. L. Sawyer, C. A. Sawyer & J. P. Sawyer	5285	20.39	Dec. 18
Little Johnny	Fort Steele	Nils Hansen & Peter Jensen	3044	12.59	March 23
Mastodon	Fort Steele	Mastodon Gld. & Copper Co	4846	51.65	Oct. 8
Nancy Hanks	Fort Steele	Caldwell Mines, Ltd. (Non-per.)	5211	51.65	Dec. 18
Ontario	Fort Steele	D. D. Mann	2997	22.27	July 19
Old Abe	〃	Caldwell Mines, Ltd. (Non-per.)	5209	51.65	Dec. 18
Paymaster	Fort Steele	L. B. Van Decan & Geo. Bremmer	3561	51.65	Aug. 1
Payroll	〃	〃 〃	3562	44.66	〃 1
Superintendent	Fort Steele	L. B. Van Decan & Geo. Bremmer	3563	35.86	〃 1
Surprise	〃	Arthur Phillips	3560	51 47	〃 14
Silver Queen	〃	Sam. Lewison, Ole J. Johnson & J. F. Armstrong, admin. estate of Andrew H. Wigen, dec'd	4826	17.03	〃 21
Selkirk	〃	A. S. Goodeve	4089	43.65	Oct. 9
Vermont Boy	Fort Steele	Hastings (B. C.) Explor. Synd., Ltd	3032A	38.10	Aug. 7
Whale	Fort Steele	Mastodon Gold & Copper Co	4847	51.65	Oct. 8

YALE.

Name of Claim.	Division.	Name of Grantee.	Lot No.	Acres.	Date.
Alma Fraction	Grand Forks	B. C. (Rossland & Slocan) Synd., Ltd	2125	13.00	Aug. 8
Ammie	〃	J. J. McMullen, P. McMullen & C. Cosgriff.	1247	47.24	Oct. 5
Alta	Kettle River	Chas. N. Mardon *et al*	1394	36.03	Dec. 3
Acorn	Grand Forks	J. J. Carraher and J. L. Manly	2230	41 00	〃 27
Bonanza	Kamloops	Scottish Copper Mines Synd. of B. C., Ltd	896	50.20	Feb. 26
Boss	〃	〃 〃	897	51.62	〃 26
Black Bess	Grand Forks	Wm. J. Porter, J. Mack & Duncan McIntosh	1689	15.80	March 5
Big Bug.	Kettle River	A. Megraw, W. H. Norris and Ida Maude Macdonald	923	35.61	〃 11
Bonanza	Grand Forks	Bonanza Mtn. Gold Mg. Co.,Ltd	2008	51.65	〃 18
Belle of Ottawa	〃	Julia O'Connor, V. O'Connor, Helen J. McColl and G. E. Drew	1343	51.65	May 30
Ben Hur	Kamloops	B. C. Exploring Synd., Ltd	1037	9.97	〃 30
Brandon	Kettle River	James McNulty, J. Marshall and Thos. Roderick	2382	45.72	July 18
Brandon Fraction	〃	〃 〃	2403	3.09	〃 18
Burnt Basin	Grand Forks	Tammany Gold Mines, Ltd. (Non-per.)	1136	51.64	Sept. 10
B. A. Fraction.	Kettle River	E. H. Thruston	2357	5.32	Oct. 23
Copperopolis	Kettle River	Geo. Riter	1852	14.58	Feb. 1
Cliff	Kamloops	Scottish Copper Mines Synd. of B. C., Ltd	899	37.94	〃 26
Colorado	Grand Forks	Bonanza Mtn. Gold Mg. Co., Ltd	2009	51.65	Mar. 18
California	Osoyoos	Benj. Anderson and H. A. Bowerman	1907	50.70	〃 23
City of Montreal	Grand Forks	Majestic Gold Mg. Co., Ltd	2225	30.58	June 5
Copper Farm	Similkameen	Chas. A. Saunders	122	48.74	July 19
Copper King	Osoyoos	Spencer Cosens	1078	45.00	Aug. 31
California	Grand Forks	J. M. Taylor *et al*	2222	51.65	Sept. 26
Chancellor	Kettle River	James Moran and J. Mulligan	1325	51.65	Oct. 2
Carmi	〃	E. H. Thruston, G. A. Lonmeman and Jos. E. Branscombe	2352	51.65	〃 23
Cracker Jack	〃	Geo. W. Rumberger and H. Nash	1195	50.71	〃 24
Daisy Fraction	Grand Forks	B. C. Chartered Co., Ltd. (Non-per.)	948	2.09	Feb. 5
Daisy	〃	B. C. (Rossland & Slocan) Synd., Ltd	1805	48.08	March 6
Daisy Fraction	〃	〃 〃	1808	19.35	〃 6
Dominion	Osoyoos	Dominion Consol. Mines Co.. Ltd. (Non-per.)	1595	51.65	〃 28
Dudley	Kettle River	I. H. Hallett and Geo. Moran	1890	39.70	Oct. 7
Dynamo	〃	Anton Portmann and Chas. Doering	2087	50.96	Dec 3
Edict	Kamloops	Robt. G. Tatlow	890	3.51	June 28
Effie	Grand Forks	Mary Louise Fall	1781	46.57	July 18
Empress No. 1.	Yale	B. C. Agency, Ld., & the B. C. Gold Trust, Ld	1804	39.81	Aug. 2
〃 〃 2.	〃	〃 〃	1805	39.81	〃 2
〃 〃 3.	〃	〃 〃	1806	21.38	〃 2
〃 〃 4.	〃	〃 〃	1807	21.95	〃 2
Excelsior.	Osoyoos	National Mg. & Dev. Co., Ltd	1906	51.65	〃 27
Falcon	Grand Forks	B. C. Chartered Co., Ltd. (Non-per.)	1496	36.96	Feb. 5
Fairplay Fraction	〃	B. C. (Rossland & Slocan) Synd., Ltd	1328	10.40	Aug. 8
Gold Mask	Kamloops	Scottish Copper Mines Synd. of B. C., Ltd	894	51.65	Feb. 26
Golden Eagle	Kettle River	W. R. Williams, D. A. Cameron, G. A. Cox and D. D. Mann	921	11.00	Mar. 19
Gem	〃	Hugh Cameron	1880	33.68	May 30
Golden Crown	Osoyoos	National Mg. & Dev. Co	1905	44.25	Aug. 27
Gold Drop	Grand Forks	Gold Dollar Mines, Ltd. (Non-per.)	1762	37.84	Dec. 27
Hilda	〃	B. C. Chartered Co., Ltd. (Non-per.)	1495	35.10	Feb. 5
Headlight	Osoyoos	Wm. F. Keller and Geo. A. Engel	1900	48.16	May 2
Homestake	Grand Forks	Donald A. Cameron	1690	29.52	〃 30
Horsefly	Osoyoos	C. H. Arundel and F. H. Wollaston	1927	38.62	June 5
Hamfat	Grand Forks	Mary Garland, Wm. S. McRea and Geo. A. Guess	1468	49.06	July 18
Helen H. Gardner	Similkameen	Clive Pringle, Jesse A. Miller & Alex. Miller	120	51.18	〃 19
Highland Queen	Kettle River	Highland Queen Consol. Mg. Co. (For.)	1331	48.70	〃 19
Homestake	Osoyoos	National Mg. & Devel. Co	1904	40.60	Aug. 27

YALE.—*Continued.*

Name of Claim.	Division.	Name of Grantee.	Lot No.	Acres.	Date.
Hardbush	Grand Forks	Laura Shonquist, Geo. R. Naden & Mary McArthur	1062	28.60	Sept. 12
Iron Dollar	"	J. R. Cheek & J. K. Riorden	2210	49.91	April 26
Idaho	Kettle River	Boundary & Beaverton Mg. Co., Ltd. (Non-per.)	2362	46.48	May 30
Iron Pyrites.	"	Elwood Channing Brown & Wm. G. McMynn	1390	51.65	" 30
Idaho Trinket	Grand Forks	John W. Cheer & J. K. Riorden	2211	31.95	Aug. 25
J. W.	"	B. C. Chartered Co., Ltd. (Non-per.)	947	44.00	Feb. 5
Joker.	Kettle River	Geo. W. Rumberger & Thos. B. Garrison	1692	7.2	March 9
J. S. Fraction	Grand Forks	Boyd Jarrell, Laura Bloom & Wm. B. Bower	1675	19.76	July 18
Johannesburg	Kettle River	Otto Dillier	2072	35.60	Aug. 19
Jim Blaine	Grand Forks	Tammany Gold Mines, Ltd. (Non-per.)	1137	35.93	Sept. 10
Kimberly Frac.	Osoyoos	Richard Parkinson.	1976	17.80	March 5
King Solomon's Mi's	Kamloops	Wm. E. Deeks.	1010	37.95	Nov. 7
Lizzie L.	Grand Forks	B. C. (Rossland & Slocan) Synd., Ltd.	1804	31.86	March 6
Lizzie L. Fraction.	"	" "	1807	23.65	" 6
Loan King	"	Wm. Hall & Jas. Richardson	2217	51.65	" 14
Le Roi	Kettle River	James Copland	1649	51.15	May 30
Lucky Strike	Kamloops	B. C. Exploring Synd., Ltd	1036	14.30	May 30
Little Burne.	Kettle River	Jas. McNulty, Jas. Marshall & Thos. Roderick	2383	51.33	July 18
Little Burne Frac.	"	" " "	2387	00.47	" 18
Little Buffalo Frac.	"	J. S. C Fraser & G. T. Crane	1717	45.09	Oct. 7
London	Grand Forks	Tim. Townend	2234	46.20	" 24
Little Duncan	Vernon	J. L. Webster	904	51.65	Dec. 23
Magnolia	Kettle River	Ernest W. Hamilton	1851	34.57	Feb. 1
Midnight	Kamloops	Scottish Copper Mines Synd. of B. C., Ltd.	895	23.05	" 26
Maple Leaf	Kettle River	Wm. J. Porter	1484	42.50	Aug. 30
Micawber	Osoyoos	Francis H. Wollaston	1075	37.88	Sept. 12
Mullaan	Grand Forks	J. J. McMullen & C. Cosgriff	1850	51.65	Oct. 7
Moscow	Kettle River	G. W. Rumberger, J. Hemenway & James Moran	1694	40 00	" 24
Midnight	Kamloops	Wm. Edgar Deeks	1011	50.16	Nov. 7
Mafeking	Osoyoos	Rich. H. Parkinson	1975	49.75	March 5
Martha May	Grand Forks	B. C. (Rossland & Slocan) Synd., Ltd	1806	45.31	" 6
Mountain View	"	Bonanza Mtn. Gld. Mg. Co., Ltd	2011	51.63	" 18
Manton Fraction.	Osoyoos	Dominion Consol. Mines Co., Ltd. (Non-per.)	1978	4.00	March 19
Mountain Monarch	Grand Forks	Julia O'Connor, Vanessa O'Connor, Helen J. McColl & G. E. Drew	1344	23.76	May 30
Night Hawk	Kamloops	Scottish Copper Mines of B. C., Ltd	898	49.46	Feb. 26
Nevada	Grand Forks	Bonanza Mtn. Gld. Mg. Co., Ltd	2010	51.65	March 18
No. 13	Kettle River	James Moran	1260	21.60	Aug. 30
Opulence	Osoyoos	Archena A. McDougall	1910	47.72	May 30
Occidental	"	Henry T. Shelton	1594	43.40	Aug. 21
Ophor	Grand Forks	Alex. L. Rogers *et al*	2219	34.32	Oct. 21
Oronoco	Kettle River	Geo. W. Rumberger	1196	46.50	" 24
Phœnix	"	Philip Aspinwall	1716	41.66	Feb. 14
Pothook	Kamloops	Scottish Copper Mines Synd. of B. C., Ltd.	893	51.65	" 26
Piper	"	" "	900	25.81	" 26
Peacock	Osoyoos	Wm. F. Keller and Geo. A. Keller	1901	47.00	May 2
Prince of India	Kamloops	B. C. Exploring Synd., Ltd	1038	25.00	" 30
Polar Bear	"	Cinnabar Mg. Co. of B. C., Ltd	925	51.65	June 28
Panorama	Vernon	John Lindsay Webster	905	50.80	Dec. 23
Queen of Sheba	Kettle River	Thos. McDonnell & Wm. Graham McMynn.	790	28.60	" 3
Reveille	Grand Forks	B. C. Chartered Co., Ltd. (Non-per.)	1499	26.07	Feb. 5
Rockland	"	Alfred J. Marks, admin. of estate of Chas. Vanness, dec'd, and Jas. W. Reeder	1493	33.30	May 30

YALE.—*Concluded.*

Name of Claim.	Division.	Name of Grantee.	Lot No.	Acres.	Date.
Red Eagle	Similkameen	A. E. Thomas	149	51.13	Oct. 4
Roany	"	J. Oswald Coulthard	118	40.10	" 7
Richmond	Grand Forks	Frank McGuire	2232	48.90	" 9
Ready Cash Frac.	Osoyoos	Jas. McGee and Edward D. Boeing	2482	46.15	Dec. 17
St. John	"	Edw. Cook and Chas. Nelson	803	51.65	Feb. 11
S. F. Fractional	Kettle River	Boundary Crk. Mg. & Mg. Co., Ltd	832	39.26	March 15
Silent Friend	"	Spencer Benerman, Jos. Adam Frank and Thos. McDonnell	1433	51.23	May 30
Susie	Osoyoos	Geo. A. Guess	1917	51.65	June 5
Sunset	Kettle River	J. J. McMullen *et al*	2068	49.76	July 11
Sibley	Grand Forks	R. S. Fraser	2223	51.50	Aug. 16
St. Louis.	"	Jos. M. Taylor *et al*	605	51.65	Oct. 4
Standard No. 2	"	Wm. Henry Latta	1780	51.65	Nov. 11
Sunset	Osoyoos	Jas. F. Campbell, H. W. Yates & Jas A. Schubert	666	41.30	" 19
St. John	Kettle River	Elmore Collier, J. O. Thompson & W. Stirling	2366	51.65	Dec. 17
St. Elmo	Grand Forks	Fred Goaf	2229	49.50	" 19
Truckee.	"	B. C. Chartered Co., Ltd. (Non-per.)	1498	29.52	Feb. 5
Texas.	Kettle River	Chas. N. Collins	2067	51.65	Aug. 16
Tammany No. 1	Grand Forks	Tammany Gold Mines, Ltd. (Non-per.)	1136	46.09	Sept. 10
Tip Top.	Kettle River	Jacob Haas	1229	38.43	Oct. 21
Vashti	Grand Forks	B. C. Chartered Co., Ltd. (Non-per.)	950	19.09	Feb. 5
Vancouver	Similkameen	Clive Pringle, Wm. G. McMynn, Wm. E. Deeks & Prescott C. McArthur	123	51.07	" 15
Virginia	"	Chas. A. Calzin	2428	51.65	Oct. 24
Wallingford	Grand Forks	John Newell	2226	43.60	April 26
Washington.	Kettle River	Boundary & Beaverton Mg. Co. Ltd. (Non-per.)	2363	40.87	May 30
War Eagle	Grand Forks	Julia O'Connor, Jas. Seale, Helen J. McColl & Geo. E. Drew	1345	35.60	" 30
War Eagle	Kettle River	Wm. Younkin	1879	50.29	" 30
White Knight	Osoyoos	Francis H. Wollaston	1081	49.50	Sept. 9

LILLOOET.

Alhambra	Lillooet	Milton Rathbun	665	24.65	Dec. 16
Copeland	"	Alfred Wellington Smith	580	24.61	March 14
Golden King	"	Daniel Hurley *et al*	587	45.44	" 14
Hiram	"	Alfred Wellington Smith	581	42.35	" 14
Lorne	"	Daniel Hurley *et al.*	588	50.25	" 14
Lurgan Frac. No. 1	"	Milton Rathbun	667	3.62	Dec. 16
Lurgan Frac. No. 2	"	"	668	8.55	" 16
Marquis	"	Daniel J. Hurley *et al*	586	24.50	Sept. 9
Metropolitan	"	Milton Rathbun	669	32.80	Dec. 16
Night Hawk	"	Milton Rathbun	666	28.25	" 16
Pioneer	"	Wm. F. Allen and Harry Atwood	456	51.14	March 6
Welland Vale	"	Toronto-Lillooet Gold Reefs Co., Ltd. (Non-per.)	578	42.97	" 23

COAST—NEW WESTMINSTER.

Name of Claim.	Division.	Name of Grantee.	Lot No.	Acres.	Date.
Australian	New West'r.	London & Pacific Gold Flds., Ltd	1848	8.00	Feb. 21
Blue Diamond	〃	〃 〃	1845	16.45	〃 21
Boss Extension	〃	〃 〃	1846	40.37	〃 21
Boss	〃	〃 〃	1847	26.16	〃 21
Baby Mine	〃	Consol. Fire Mtn. Mines, Ltd	1691	51.65	March 21
Copper Queen	〃	Lee J. Pitner	1943	27.91	Nov. 15
Day Dawn	〃	London & Pacific Gold Flds., Ltd	1842	24.98	Feb. 21
Elk	〃	〃 〃	1844	43.65	〃 21
Empress	〃	L. J. Boscowitz	1926	51.65	Sept. 10
Free Gold	〃	Consol. Fire Mtn. Mines, Ltd	1686	38.61	March 21
Gold Queen	〃	〃 〃	1693	35 08	〃 21
Kalispell	〃	Britannia Copper Synd., Ltd. (Non-per.)	1937	48.93	Dec. 27
Lynn	〃	Lee J. Pitner	1942	26.83	Nov. 15
Money Spinner	〃	Consol. Fire Mtn. Mines, Ltd	1685	30.30	March 21
Mitchell	〃	Lee J. Pitner	1946	35.17	Nov. 15
Neptune	〃	Consol. Fire Mtn. Mines, Ltd	1687	49.54	March 21
Prince	〃	〃 〃	1695	42.39	〃 21
Quartz Kop Frac.	〃	London & Pacific Gold Flds., Ltd	1875	45.63	Feb. 21
Raven	〃	〃 〃	1848	13.35	〃 21
Ruby	〃	〃 〃	1874	26.88	〃 21
Summit	〃	Lee J. Pitner	1944	38.94	Nov. 15
Transvaal	〃	London & Pacific Gold Flds., Ltd	1843	47.13	Feb. 21
Tellurium	〃	Consol. Fire Mtn. Mines, Ltd	1694	40.59	March 21
Violet	〃	Jas. H. McGregor and Wm. J. Taylor	1921	26.00	Feb. 4
Victor	〃	Lee J. Pitner	1945	32.32	Nov. 15
Wonderful	〃	Consol. Fire Mtn. Mines, Ltd	1690	40.70	March 21

COAST—NANAIMO.

Name of Claim.	Division.	Name of Grantee.	Lot No.	Acres.	Date.
Annie Laurie	Nanaimo	Robt. Chas. Ferguson	386	51.65	Nov. 4
Adam	〃	Wilfred V. Radley and E. V. Shaw	357	50.24	Dec. 13
Boulder Nest	〃	Puget Sound Iron Co	265	31.37	Sep. 13
Hill	〃	L. H. Hills and W. A. Young	244	43.80	March 23
Harbour	〃	Wilfred V. Radley and E. V. Shaw	353	22.40	Dec. 13
Harbour Fraction	〃	〃 〃	354	9.32	〃 13
Isis	〃	Robt. Chas. Ferguson	384, R 1	45.23	Nov. 4
Jack North	〃	Puget Sound Iron Co	266	36.34	Sep. 13
Le Roi	〃	〃	264	46.28	〃 13
L. M. C.	〃	〃	268	41.08	〃 13
Molly Gibson	〃	W. V. Radley and E. V. Shaw	359	49.38	Dec. 13

COAST—NANAIMO.—*Concluded.*

Name of Claim.	Division.	Name of Grantee.	Lot No.	Acres.	Date.
Protection	Nanaimo	W. V. Radley	356	51.23	Dec. 13
Riverside	〃	Robt. Chas. Ferguson	387, R 1	15.71	Nov. 4
Shamrock	〃	Cuba Silver Mg. Co. of B. C., Ltd	416	34.11	July 12
Sunset	〃	W. V. Radley & E. V. Shaw	358	47.09	Dec. 13
Volunteer	〃	〃 〃	355	48.61	〃 13
Yellow Kid	〃	Puget Sound Iron Co	267	12.03	Sep. 13

COAST—VICTORIA.

Name of Claim.	Division.	Name of Grantee.	Lot No.	Acres.	Date.
Alice	Victoria	S. A. Richards *et al*	40G	51.60	Sep. 13
Alida Fractional	〃	Jerry S. Rogers & Claudius P. Aubert	28G	12.00	Oct. 21
Big Four	〃	Mt. Sicker & B. C. Develop. Co., Ltd	88G	51.65	July 29
Golden Queen	〃	Samuel A. Richards *et al*	42G	51.65	Sep. 13
Magic Fractional	〃	Tyee Copper Co., Ltd	41G	3.70	〃 13
Nome	〃	Neil McLennan, Jas. Hy. Little & Nils A. Klassell	101G	36.98	Oct. 10
Queen Bee	〃	〃 〃 〃	100G	39.50	〃 10
York	〃	〃 〃 〃	98G	50.46	〃 10

COAST—ALBERNI.

Name of Claim.	Division.	Name of Grantee.	Lot No.	Acres.	Date.
Faith	Alberni	James M. Ashton	454	42.30	March 11
General James M.	〃	〃	318	51.65	〃 11
Horne	〃	Adam H. Horne	116	51.65	〃 23
Lady Frances	〃	Mary F. Ashton	319	51.65	〃 11
Leviathan	〃	James M. Ashton	322	21.90	〃 11
Leviathan No. 2	〃	〃	323	8.90	〃 11
Leviathan Frac.	〃	〃	391	2.17	〃 11
Superb	〃	〃	320	33.10	〃 11
Success	〃	〃	321	48.38	〃 11
Thomas		Thos. J. Thomas	117	51.00	〃 23
Union	〃	Mt. Sicker & B. C. Develop. Co., Ltd	54	15.10	〃 29

GOLD COMMISSIONERS AND MINING RECORDERS.

Mining Districts and Divisions.	Location of Office.	Gold Commissioner.	Mining Recorder.	Sub-Recorder.
Cassiar District	Telegraph Creek	James Porter		
Stikine	″		James Porter	
Liard	″		″	
Teslin Lake	Telegraph Creek		″	
Sub-office	Atlin			E. J. Thain.
Atlin District	Atlin	J. D. Graham		
Atlin Lake	″		E. J. Thain	
Bennett Lake	Bennett		T. DesBrisay	
Chilkat	Wells		W. J. Rant	
Skeena District	Victoria	W. S. Gore		
Skeena River	Fort Simpson		John Flewin	
Sub-office	Masset			C. Harrison.
″	Kitsilas			S. A. Singlehurst.
″	Kitimat			Geo. Raley.
″	Essington			Peter Herman.
Bella Coola	Victoria		W. S. Gore	
Omineca District	Manson Creek	F. W. Valleau		
Omineca	″		F. W Valleau	
Sub-office	Tom Creek			Jos. Lyon.
Cariboo District	Barkerville.	John Bowron		
Cariboo	″		John McKen	
Quesnel	Quesnel Forks		W. Stephenson	
Sub-office	Harper's Camp			J. Mackay.
Lillooet District				
Clinton	Clinton	F. Soues	F. Soues	
Lillooet	Lillooet	C. Phair	C. Phair	
Kamloops District	Kamloops	G. C. Tunstall		
Kamloops	″		E. T. W. Pearse	
Sub-office	Nicola			Geo. Murray.
Ashcroft	Ashcroft		J. W. Burr	
Similkameen	Princeton		H. Hunter	
Sub-office	Nicola			Geo. Murray.
Yale	Yale.		Wm. Dodd	
Vernon District	Vernon	L. Norris		
Vernon	″		J. C. Tunstall	
Boundary District				
Osoyoos	Fairview	C. A. R. Lambly	J. R. Brown	
Sub-office	Olalla			D. Black.
Kettle River	Greenwood	W. G. McMynn	W. G. McMynn	
Sub-office	Vernon			J. C. Tunstall.
″	Camp McKinney			H. Nicholson.
Grand Forks	Grand Forks	S. R. Almond	S. R. Almond	
Sub-office	Beaverdell			A. Megraw.
Golden District	Golden	J. E. Griffith		
Golden	″		F. C. Lang	
Windermere	Windermere		John Bulman	
Fort Steele District	Fort Steele	J. F. Armstrong		
Fort Steele	″		L. W. Patmore	
Sub-office	Tobacco Plains			M. Phillipps.
″	Fernie			A. McLeod.
″	Cranbrook			F. R. Morris.
″	Kimberley			E. Elwell.
″	Moyie			F. D. Hope.

Mining Districts and Divisions.	Location of Office.	Gold Commissioner.	Mining Recorder.	Sub-Recorder.
Revelstoke District	Revelstoke	Frederick Fraser		
Revelstoke	〃		Fred. Fraser	
Illecillewaet				
Lardeau	Comaplix		Geo. Sumner	
Trout Lake	Trout Lake		F. C. Campbell	
Slocan District	Kaslo	E. E. Chipman		
Slocan	New Denver		Angus McInnes	
Sub-office	Sandon			Thos. Brown.
Slocan City	Slocan City		H. P. Christie	
Ainsworth	Kaslo		A. Lucas	
Sub-office	Howser			Wm. Simpson.
Nelson District	Nelson	John A. Turner		
Nelson	〃		Harry Wright	
Sub-office	Ymir			A. B. Buckworth
Goat River	Creston		E. N. Murphy	
Arrow Lake	Nakusp		Walter Scott	
Sub-office	Vernon			J. C. Tunstall.
Rossland District	Rossland	John Kirkup		
Trail Creek	〃		J. A. Hooson	
Nanaimo District	Nanaimo	Marshal Bray		
Nanaimo	〃		Marshal Bray	
Alberni District	Alberni	A. L. Smith		
Alberni	〃		A. L. Smith	
West Coast V. I.	Clayoquot		W. T. Dawley	
Victoria District	Victoria	W. S. Gore		
Victoria	〃		W. S. Gore	
New Westminster	New Westminster.		D. Robson	
Sub-office	Harrison Lake			L. A. Agassiz.
〃	Vancouver			R. J. Skinner.
〃	Chilliwhack			J. Pelly.

DECISIONS

Of the Geographic Board of Canada, relating to Geographic Names in British Columbia.

By Order in Council dated December 18th, 1897, the Governor-General in Council was pleased to create a "Geographic Board," and was further "pleased to order and direct that all questions concerning geographic names in the Dominion which arise in the departments of the public service shall be referred to the Board, and that all departments shall use in their publications the names and orthography adopted by the Board."

At the request of the Dominion Government that the Provincial Government appoint a representative on the "Geographic Board," the Lieutenant-Governor in Council was pleased to appoint Wm. F. Robertson, Provincial Mineralogist, a member of the Board, representing British Columbia. The second Report of the Board, containing a large number of rulings relating to British Columbia names, may be obtained from the Provincial Mineralogist, Victoria.

ERRATA.

The report on the West Coast of Vancouver Island Mining Division, beginning on page 1098, was inadvertently credited to Mr. Chester F. Lee, instead of to Dr. T. Rhymer Marshall.

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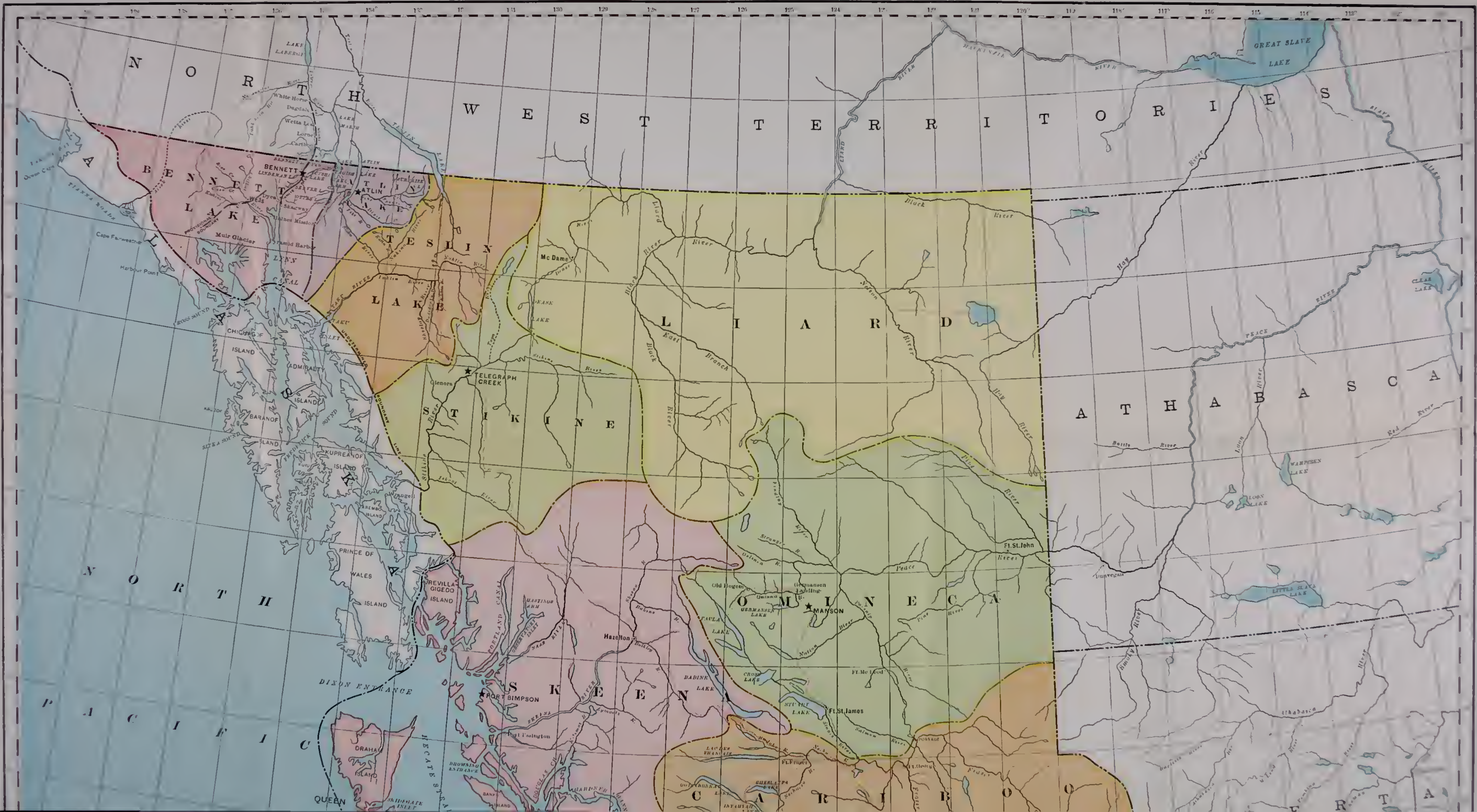

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ATLIN LAKE
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LIARD
STIKINE
OMINECA
SKEENA
CARIBOO
BENNETT
ATLIN
TELEGRAPH CREEK
MANSON
McDame
Glenora
Hazelton
PORT SIMPSON
Port Essington
Ft.St.John
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Ft.McLeod
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Dunvegan
Old Hogem
Germansen Landing
GERMANSEN LAKE
BABINE LAKE
STUART LAKE
CROSS LAKE
TAKLA LAKE
White Horse
Lake Laberge
Lake Marsh
Lindeman L.
Dyea
Skagway
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Muir Glacier
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REVILLA GIGEDO ISLAND
Wrangell
DIXON ENTRANCE
HECATE STRAIT
GRAHAM ISLAND
QUEEN
PORTLAND CANAL
DEASE LAKE
LITTLE SLAVE LAKE
WABASCA LAKE
Mackenzie River
Liard River
Peace River
Hay River
Nelson River
Black River
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Loon River
Red River
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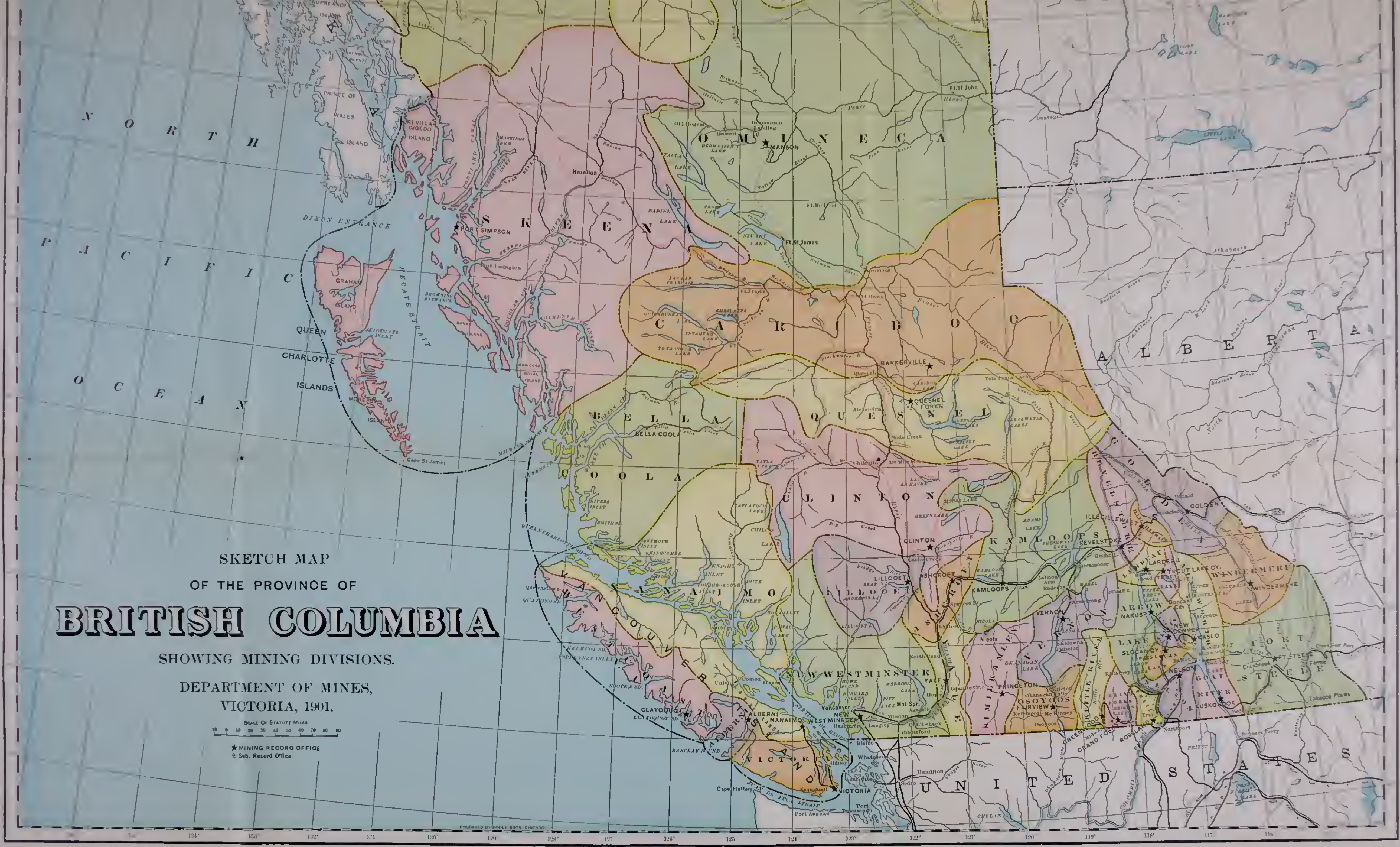

SKETCH MAP

OF THE PROVINCE OF

BRITISH COLUMBIA

SHOWING MINING DIVISIONS.

DEPARTMENT OF MINES,

VICTORIA, 1901.